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Are Empowerment and Education Enough? Underdiversification in 401(k) Plans

AT THE END of 2000, current and former employees of the energy trading company Enron Corporation held $2.1 billion in the firm's 401(k) retirement savings plan. Sixty-two percent of that money was invested in Enron stock, then trading at $83 a share. In October 2001 Enron's finances began to unravel as its accounting improprieties came to light. Enron stock plummeted over the next several weeks, and on December 2, 2001, the company declared bankruptcy, rendering its shares worthless. Thousands of Enron employees lost their jobs and a large fraction of their retirement wealth simultaneously.

Although the Enron 401(k) debacle was highly publicized, Enron was neither the first nor the last company whose collapse decimated its workers' 401(k) accounts. Over the past few years a similar fate has befallen employees of WorldCom, Global Crossing, Polaroid, Kmart, Lucent, and Providian, among others. In response, many bills have been proposed in Congress that would regulate employer stock holdings within 401(k) plans. Compared with existing law on *defined-benefit* pension plans, which strictly prohibits plans from holding more than 10 percent of their assets in employer securities, most of the bills proposed for regulating *defined-contribution* plans appear mild. Common themes in these proposals are empowerment and education rather than prohibition: give employees the right to sell the employer stock in their 401(k), and inform them about the risks of not doing so.

For example, one of only two bills that have so far come up for a vote in either house of Congress, the Pension Security Act (see table A-1 in the appendix), has two key provisions relating to employer stock. First, it would prohibit employers from requiring employees to invest their own 401(k) contributions in employer stock. Second, it would require that employers *allow* plan participants to diversify any matching funds contributed by the employer three years after receiving that match. Other proposed legislation would require that plan participants be notified if the fraction of their assets invested in employer stock exceeds a certain threshold (such as 20 percent), that companies offer a certain number of alternatives to employer stock if it is made an investment option, or that companies educate plan participants about the risks of not diversifying their assets.

This paper assesses how effective the "empower and educate" regulatory approach might be at reducing 401(k) employer stock holdings. We begin by studying five natural experiments in which employees experienced a discrete change in the restrictions on employer stock holdings. In these examples the restrictions changed for one of two reasons: either employees crossed an age or tenure threshold above which they were allowed to diversify their holdings, or the company changed its rules to enable all employees to diversify their investments. We find only a modest employee response to either type of change. Merely allowing diversification does not cause it to happen.

We then consider whether educational efforts might motivate employees to diversify out of employer stock. Although many studies have concluded

that financial education does affect employees' choices, the subset of studies that randomly assign education *and* measure subsequent actions have found small effects.[1] These studies still leave open the possibility that other kinds of education might yield larger behavioral changes.

Here we evaluate a different form of education: witnessing the real-life experience of others. Economists since Armen Alchian in the 1950s have argued that the imitation of successful strategies (and, conversely, the avoidance of unsuccessful strategies) is an important force pushing economic actors toward optimal behavior.[2] We test this hypothesis in the context of the media coverage surrounding the Enron, WorldCom, and Global Crossing bankruptcies. Specifically, we investigate how much workers at *other* companies reduced their employer stock holdings in response to the blizzard of media stories early in this decade illustrating the dangers of putting all of one's retirement savings in employer stock.

We chose Enron, WorldCom, and Global Crossing because a large percentage of their employees' 401(k) assets was held in employer stock, and because their bankruptcies, the associated accounting scandals, and their decimated 401(k) plans received so much attention from so many media outlets. For example, the *New York Times* ran 1,364 stories mentioning Enron during the last quarter of 2001 and the first quarter of 2002, of which 112 ran on the front page.

We find that this media barrage had a surprisingly modest impact on employer stock holdings in other 401(k) plans, reducing the fraction of assets held in employer stock by no more than 2 percentage points from an initial 36 percent of balances. We present evidence that this small reaction is not due to restrictions on diversification. In addition, we show that workers in Texas, who were likely to have been disproportionately exposed to Enron-related news, did not reduce their investment in employer stock any more than did workers outside of Texas. Even in Houston—Enron's headquarters—where the *Houston Chronicle* ran 1,122 stories mentioning Enron in the six months surrounding the firm's collapse, employees did not show evidence of learning the lesson of Enron.

This paper raises broader questions about retirement savings policy. It adds to the convergent body of evidence that many employees do not make optimal financial decisions. Households typically behave passively,

1. Duflo and Saez (2003); Choi and others (2002); Choi, Laibson, and Madrian (2005a).
2. Alchian (1950).

following the path of least resistance. Such inertia often translates into household acceptance of the investment choices made automatically by their company on their behalf, even when those default choices are sub-optimal for them.[3] For example, many firms automatically allocate 401(k) matching funds to employer stock, where the money typically stays even if employees are permitted to subsequently rebalance their portfolio.

Two policy solutions present themselves. First, society could give firms incentives to adopt socially optimal default choices.[4] However, it is not always obvious what such optimal defaults would be. Moreover, one default is rarely right for every employee, since employees face different econo-mic circumstances. Alternatively, society could adopt default-free systems, which do not confer an advantage on one choice over another, by forcing employees to explicitly state their preference.[5] However, default-free sys-tems will work only if employees are likely to make good decisions when forced to do so.

We begin with a brief summary of the current regulation of employer stock in 401(k) plans. We then summarize previous research on employer stockholding in 401(k) plans and how 401(k) outcomes are affected by plan features. Next we describe the employee-level 401(k) data we have for the seven companies examined in our analysis. Our empirical analysis begins with the results from five natural experiments on relaxing diversification restrictions. We then turn to examining the impact of the Enron, WorldCom, and Global Crossing crises on employer stock holdings for a large sample of employees at other firms. We conclude by discussing alternative legisla-tive approaches that *are* likely to decrease employer stock holdings substan-tially, and implications for savings policies more generally.

Regulation of Employer Stockholding in 401(k) Plans

Like defined-benefit pension plans, 401(k) plans are primarily regulated under the Employee Retirement Income Security Act of 1974 (ERISA).[6] Under ERISA, plan fiduciaries have four responsibilities: to act for the

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3. Madrian and Shea (2001); Choi and others (2002); Choi, Laibson, and Madrian (2005a).
4. Choi and others (2003, 2005).
5. Choi and others (2005); Choi, Laibson, and Madrian (2005b).
6. This section draws heavily on Ng (2003) and Reish and Faucher (2002).

exclusive benefit of plan participants and their beneficiaries (the "exclusive purpose rule"); to act with the care, skill, prudence, and diligence that a prudent person acting in a similar capacity would use (the "prudent man rule"); to diversify plan assets across different types of investments, geographic areas, industrial sectors, and dates of maturity so as to reduce the chance of large losses (the "diversification rule"); and to act in accordance with plan documents.

At the time ERISA was passed, defined-benefit pension plans were the primary employer-sponsored mechanism for providing income to persons in retirement. To help safeguard the assets of these plans, ERISA explicitly caps the holdings of employer stock at 10 percent of total assets. Defined-contribution plans, however, face no such limit. The most common type of defined-contribution plan today, the 401(k) plan, did not exist when ERISA was enacted. Those defined-contribution plans that did exist consisted mainly of profit-sharing plans, to which employers made variable contributions based on company earnings, and employee stock ownership plans (ESOPs), which were explicitly designed to encourage ownership of employer stock. ERISA exempts these plans from the diversification requirements for employer securities.

When 401(k) plans were first authorized, in 1978, it was not anticipated that they would supplant defined-benefit pension plans as the primary source of employee retirement income. Hence Congress did not extend the 10 percent limit on employer stock holdings to 401(k) plans. Employers thus have much latitude in determining how much employer stock employees may hold in their 401(k).

A common way of holding employer stock in a 401(k) is through an ESOP. This combination of a 401(k) and an ESOP is sometimes referred to as a KSOP. Many companies, however, offer employer stock in their 401(k) plan without an ESOP, and many companies also operate an ESOP that is separate from the 401(k) plan. A KSOP is a savings plan intended to benefit employees, but it is also a corporate finance mechanism that encourages employee ownership. The KSOP's dual purposes can create a conflict of interest between plan beneficiaries and the employer. As a result, employer stock regulations for 401(k) plans with an ESOP differ from those for plans without one.

A 401(k) plan without an ESOP may not require that more than 10 percent of the employee's *own* contributions be held in employer stock. This requirement does not hold for a KSOP. Neither plan, with or without an

ESOP, is limited in the amount of *matching* contributions by the employer that may be directed into employer stock. All assets within an ESOP, however, are subject to a set of explicit diversification requirements. Employees with ten years of tenure must be allowed to diversify 25 percent of their employer stock holdings once they reach age fifty-five, and 50 percent once they reach age sixty. (These diversification requirements do not apply to employer stock holdings outside of an ESOP.) Companies can and do, however, adopt diversification policies that are more generous than those mandated by ERISA. Finally, should a lawsuit arise, the fiduciary standards of prudence and exclusive purpose against which the company's behavior is judged are lower for a KSOP than for a 401(k) plan without an ESOP, because of the dual purposes of the former.[7]

Previous Research on Employer Stock in 401(k) Plans

Olivia Mitchell and Stephen Utkus report that, averaging across all 401(k) plans—including those *without* employer stock as an investment option—19 percent of plan assets are held in employer stock.[8] This statistic understates the diversification problem, since most participants do not have employer stock as an investment option—their employers do not offer it or are not publicly held firms. Only about 10 percent of companies offer employer stock in their 401(k) investment menu. Because these companies tend to be larger firms, 35 percent of all 401(k) participants are in plans that do include employer stock as an option.[9] These employees often have 401(k) portfolios that are heavily concentrated in employer stock. William Even and David Macpherson calculate that 50 percent of assets in plans offering employer stock were held in employer stock in 1998.[10]

Plans offering employer stock can be further divided into those in which the employee must choose an investment allocation for the employer match and those in which the employer match is directed into employer stock by default. In 2001 two-thirds of those plans directing the match into

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7. Ng (2003); Reish and Faucher (2002).
8. Mitchell and Utkus (2003), citing Holden and VanDerhei (2001) and VanDerhei (2002).
9. Even and Macpherson (2004).
10. Even and Macpherson (2004).

employer stock allowed participants to immediately trade out of employer stock, whereas the rest imposed a holding requirement.[11] Sarah Holden and Jack VanDerhei report that, in plans that offer employer stock as an investment option but do not direct the match into employer stock, 22 percent of assets are held in employer stock; in plans in which the employer match is directed into employer stock, a much larger fraction of assets, 53 percent, is held in employer stock.[12]

The Enron, WorldCom, and Global Crossing bankruptcies highlighted two major risks associated with concentrated investments in employer stock. First, investing in any single security is riskier than investing in a diversified portfolio such as a mutual fund. Several studies have estimated that, on a risk-adjusted basis, a single-stock portfolio is worth less than half the equivalent amount invested in a diversified portfolio.[13] Second, the value of employer stock may be positively correlated with employees' labor income; as noted at the outset, many Enron employees simultaneously lost their jobs *and* their retirement savings.

Shlomo Benartzi and coauthors identify some benefits to employees from holding employer stock in their 401(k) plan, but they note that these benefits are small relative to the substantial costs of nondiversification.[14] Why then do employees invest so much of their 401(k) portfolios in employer stock? A number of psychological factors may be important.

Employees may underestimate the risk of employer stock because of "familiarity bias." The John Hancock Financial Services Defined Contribution Plan Survey finds that participants on average rate employer stock as less risky than an equity mutual fund.[15] Similarly, Benartzi and others find that only 33 percent of participants believe that their employer stock is riskier than a diversified stock fund, whereas 39 percent believe it is

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11. Fidelity Investments (2002).

12. Holden and VanDerhei (2001) and VanDerhei (2002); these authors use administrative data to calculate the fraction of assets held in employer stock, whereas Even and Macpherson (2004) use IRS Form 5500 (tax reporting) data. The numbers in the two sources are not directly comparable.

13. Poterba (2003); Meulbroek (2005); Brennan and Torous (1999).

14. Benartzi and others (2004). See also Brown, Liang, and Weisbenner (forthcoming) for a discussion of the costs and benefits to firms and workers of holding employer stock in the 401(k) plan.

15. John Hancock Financial Services (2002). Interestingly, the perceived risk of employer stock in the John Hancock survey has not changed much over time, even following the Enron scandal.

equally risky and 25 percent believe it is safer. Furthermore, 20 percent of respondents said they would prefer $1,000 in employer stock that they could *not* diversify until age fifty over $1,000 that they could invest at their own discretion.[16]

Lauren Cohen argues that loyalty to one's employer motivates workers to hold employer stock.[17] He finds that the share of employer stock held in 401(k) plans by employees of standalone firms is 10 percentage points greater than that of employees of conglomerates. Furthermore, when a division is spun off from a conglomerate, the average employee's holding of employer stock increases, whereas it decreases following a merger. Cohen finds no evidence that employees have superior information about future employer stock returns.

Benartzi, Choi and others, and Gail Huberman and Paul Sengmueller find that current contributions to employer stock are increasing in the stock's past returns.[18] If employees think past returns predict future returns, then the high volatility of employer stock relative to mutual funds and the inability to sell securities short in a 401(k) will jointly lead to over-weighting of employer stock in the average 401(k) portfolio. Intuitively, employer stock is likely to be in either the upper or the lower tail of the 401(k) asset return distribution in any given period. Upper-tail outcomes have a greater impact on asset allocation than lower-tail outcomes because of the constraint on short sales. Like Cohen, Benartzi finds no correlation between employee allocations to employer stock and the stock's subsequent returns.

Benartzi and Richard Thaler suggest that naïve strategies for diversifying across investment options cause many investors to allocate part of their contributions to employer stock simply because it is available in the 401(k) menu.[19] Nellie Liang and Scott Weisbenner report evidence consistent with this hypothesis specifically for employer stock.[20] Employees may also perceive the presence of employer stock in the 401(k) fund menu as an endorsement of the stock by the employer. Benartzi, Holden,

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16. Benartzi and others (2004).
17. Cohen (2005).
18. Benartzi (2001); Choi and others (2004b); Huberman and Sengmueller (2004).
19. Benartzi and Thaler (2001).
20. Liang and Weisbenner (2002).

and VanDerhei, and Jeffrey Brown, Liang, and Weisbenner, find that discretionary contributions to employer stock are higher in firms where the employer directs matching contributions into employer stock than in firms where employer stock is simply available as another investment option.[21]

These investment menu effects are consistent with a growing body of literature that finds that 401(k) savings outcomes are strongly affected by the features of the plan, even when those features do not explicitly restrict employee choices. Madrian and Dennis Shea, as well as Choi and coauthors, document the tendency of participants to passively accept 401(k) enrollment, contribution, and investment fund defaults.[22] Switching from an opt-in to an opt-out enrollment mechanism raises 401(k) participation rates six months after hire by over 50 percentage points at some firms. The vast majority (65 to 87 percent) of newly hired employees retain the automatic enrollment default contribution rate and asset allocation upon enrollment in the 401(k) plan. Although the fraction of employees at the default declines over time, the inertia is very strong: three years after hire, nearly half of participants are still at the defaults. Generalizing from these results, one might expect that employer matching contributions made in employer stock will stay in employer stock, even if participants are able to immediately diversify out.

Choi and others show that requiring employees to explicitly choose within a month of hire whether or not to participate in a 401(k) plan (thus removing the option of passively accepting a default outcome) raises the initial participation rate by 28 percentage points, and the average contribution rate by 1.2 percentage points, relative to a standard opt-in enrollment procedure.[23] Such an "active decision" mechanism may also be an effective way of encouraging employees to diversify their assets. Employees could be told to make an explicit asset allocation choice for their employer matching funds, instead of the current system in which employers may direct matching funds into employer stock by default.[24]

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21. Benartzi (2001); Holden and VanDerhei (2001); Brown, Liang, and Weisbenner (forthcoming).
22. Madrian and Shea (2001); Choi and others (2002, 2004a).
23. Choi and others (2005).
24. We are exploring this possibility in an additional natural experiment not discussed here.

Employee-Level Data on 401(k) Participation

The employee-level data that we use to examine the holding of employer stock in 401(k) plans come from Hewitt Associates, a large benefits administration and consulting firm. We use two different types of administrative data. The first is a series of repeated year-end cross sections containing all persons employed at the company at the time of the data snapshot. These cross sections include demographic information such as birth date, hire date, and compensation. They also include information on the worker's 401(k) participation at the time of the cross section, such as date of first participation, total balances in the plan, and allocation of assets among the available funds. The second type of data we have is a history of every transaction made in the plan since Hewitt assumed its administration. These longitudinal data are available for two of the companies analyzed in this paper (companies D and F).[25] For all of these firms, our analysis is restricted to active employees. Tables 1 and 2 summarize the demographic and 401(k) plan characteristics of the seven firms studied in this paper.

**Empowerment: The Effect of Relaxing
Diversification Restrictions**

As already noted, current 401(k) regulations allow companies to severely restrict their employees' diversification out of employer stock. Eighteen of the twenty-one congressional proposals in appendix table A-1 to reform 401(k) employer stock regulations would relax these restrictions, permitting employees to trade out of employer stock in their 401(k) sooner.

To assess whether relaxing holding requirements would significantly reduce employer stock holdings, we study two types of natural experiments at five companies, all of which direct the employer match into employer stock. The first type results from changes in the diversification restrictions that employees face either as they age or as they increase their tenure at the company. We examine how much employees divest themselves of employer stock when they clear the applicable age or tenure hurdles. The second type of natural experiment arises from company-wide

25. The names of the companies are withheld for reasons of confidentiality.

Table 1. Workforce Characteristics of the Firms in This Study, End of 2003

Company	Average age of employees (years)	Percent male	Percent married	Average annual salary	Median annual salary	Total employees
A	44.9	76	n.a.	n.a.	n.a.	~20,000
B	39.7	54	n.a.	n.a.	n.a.	~10,000
C	39.0	35	n.a.	n.a.	n.a.	100,000+
D	41.2	40	62	$57,422	$46,910	~40,000
E	34.9	52	n.a.	$51,991	$37,040	~10,000
F	44.8	28	n.a.	$66,253	$61,975	~15,000
G[a]	37.3	64	n.a.	n.a.	n.a.	100,000+
Memorandum:						
U.S. workforce	39.7	53	59	$36,522	$27,000	n.a.

Sources: Authors' calculations and March 2004 Current Population Survey.
a. As of the end of 2002.
n.a. Not available.

161

Table 2. Features of the 401(k) Plans at the Firms in This Study, End of 2003

| Company | No. of investment options | Percent of assets in employer stock | Percent of assets in match account | Employer match | | Allowable employer stock diversification |
				Match structure	Vesting	
A	9	58	45	55 to 125 percent match, depending on profitability, up to 6 percent of pay contributed; directed into ESOP	100 percent immediate	Old: 25 percent at age fifty-five and 50 percent at age sixty with ten years of tenure New: 25 percent at age forty-five, 50 percent at age fifty, 100 percent at age fifty-five
B	9	65	49	50 percent match up to 6 percent of pay contributed; directed into ESOP	Five-year graduated	25 percent at age fifty, 50 percent at age fifty-five, 75 percent at age sixty with ten years of tenure
C[a]	14	69	50	100 percent match up to 5 percent of pay contributed; directed into ESOP	Three-year graduated	50 percent after ten years in plan or age fifty-five with five years in plan; 100 percent at age 70½, or age sixty with five years in plan

D	7	28	25	50 percent match up to 5 percent of pay contributed; additional profit-contingent match possible; directed into ESOP	100 percent immediate	Old: 25 percent at age fifty-five and 50 percent at age sixty with ten years of tenure New: 100 percent immediately
E	8	21	24	100 percent match up to 4 percent of pay contributed; directed into employer stock	Graduated (100 percent at 5,000 hours)	100 percent immediately
F	11	46	36	75 percent match up to 6 percent of pay contributed	Five-year graduated	100 percent immediately
G[a]	8	77	21	150 percent on first 1 percent of pay contributed; 50 percent on next 4 percent of pay contributed; directed into employer stock	Three-year cliff	100 percent immediately

Source: Plan documents. All companies offer employer stock as one of the investment options.
a. Plan information as of end of 2002.

rule changes that eliminate or relax holding requirements for all employees. We measure how much employer stock holdings fall after such regime shifts.
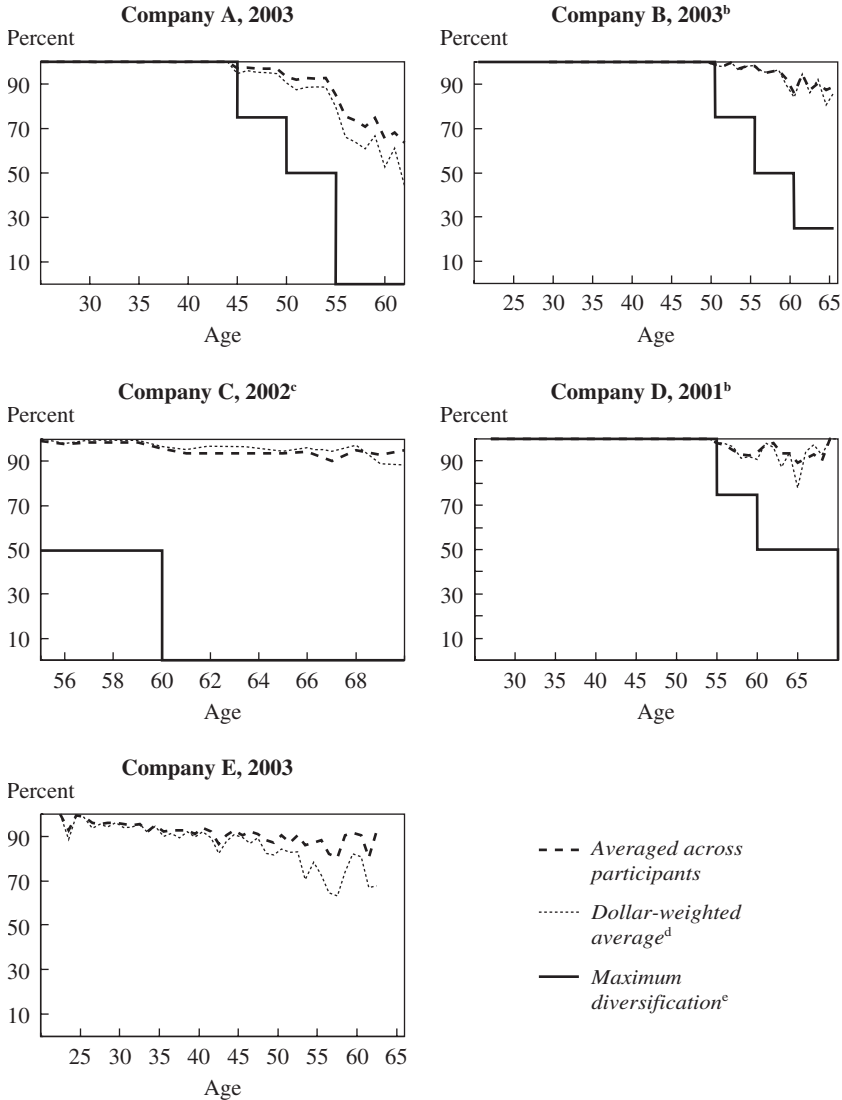
Allowing Older Employees to Diversify out of Employer Stock

We begin with the firm we designate as company D, whose 401(k) employer stock is in an ESOP and thus subject to the ESOP diversification rules described above (for employees with ten years of tenure, 25 percent diversification is allowed at age fifty-five, and 50 percent at age sixty). The middle right panel in figure 1 shows the effect on employee portfolios of crossing these age and tenure thresholds. It compares the actual average fraction of employer matching balances held by individual participants of a given age in employer stock, as well as the actual dollar-weighted average fraction (that is, total employer stock balances divided by total balances for all employees of a given age), with the fraction that employees with at least ten years of tenure would hold if they all diversified the maximum amount allowed. The figure shows that actual diversification is minimal. Across all ages, the average participant holds at least 90 percent of match balances in employer stock, even as the maximum diversification allowed increases to 50 percent. There is no consistent divergence between the dollar-weighted and the unweighted series, suggesting that wealthier employees are not more likely to divest than poorer employees. This absence of a wealth gradient in diversification holds for many of the companies we study in this paper.

As previously noted, some companies have employer stock diversification policies that are less restrictive than what is legally required.[26] One of these is company A, which also has an ESOP within its 401(k) plan. Although this firm is subject to the same ESOP diversification requirements as company D, it voluntarily adopted less stringent diversification rules in 2002, allowing employees to diversify up to 25 percent of the employer stock in their match account at age forty-five, 50 percent at age fifty, and 100 percent at age fifty-five.

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26. Many firms have voluntarily relaxed their diversification restrictions following the collapse of Enron (Fidelity Investments, 2002), probably because of the negative publicity surrounding employer stock diversification restrictions and the liability risks of maintaining such restrictions.

Figure 1. Shares of Employer Match 401(k) Balances Held in Employer Stock at Five Companies, by Employee Age[a]

Company A, 2003

Percent

Age

Company B, 2003[b]

Percent

Age

Company C, 2002[c]

Percent

Age

Company D, 2001[b]

Percent

Age

Company E, 2003

Percent

Age

- - - *Averaged across participants*

········ *Dollar-weighted average[d]*

——— *Maximum diversification[e]*

Source: Authors' calculations using data from Hewitt Associates.
a. Data for all companies are as of the end of the indicated year.
b. The sample is restricted to employees with at least ten years of tenure.
c. The sample is restricted to employees with at least five years of tenure.
d. Aggregate employer stock balances in employer match accounts divided by aggregate employer match account balances.
e. Share consistent with maximum possible diversification allowed under company policy. Company E had no restrictions at the time.
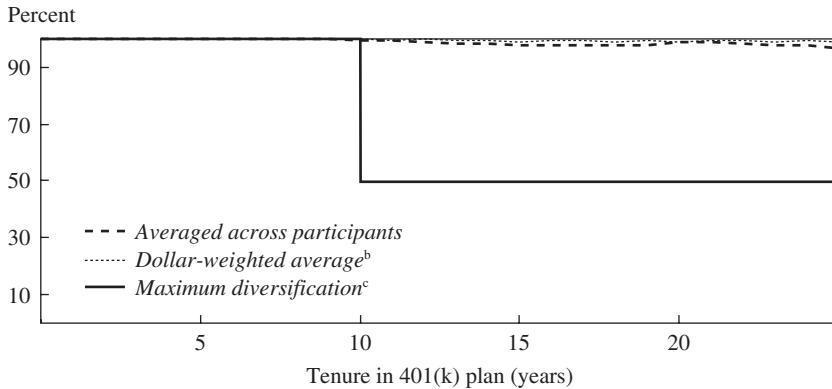
The top left panel of figure 1 plots the relationship at company A between age and the fraction of match balances in employer stock at the end of 2003, approximately eighteen months after diversification restrictions were relaxed. Among employees between the ages of forty-five and fifty, the average (non-dollar-weighted) fraction held in employer stock fell by 7 percentage points. This is less than a third of the diversification available to these employees. Among employees at age fifty-five, employer stock holdings fell further, to 85 percent of total match balances, also about one-third of the actual diversification available. Among employees at age fifty-six, the fraction of match balances held in employer stock fell to 76 percent, about one-quarter of the actual available diversification, and the proportion does not drop below 64 percent through age sixty-five. In this company, dollar-weighted averages fell slightly more, indicating that richer employees are more eager to divest themselves of employer stock, but even the dollar-weighted share is far from the maximum allowed diversification.

Two other companies that have age- or tenure-based diversification rules—companies B and C—have life cycle diversification patterns similar to those of company A. Company B allows participants with at least ten years of service to diversify 25 percent of their match balance holdings starting at age fifty, 50 percent starting at age fifty-five, and 75 percent starting at age sixty. The top right panel of figure 1 shows the fraction of employer match balances held in employer stock at company B at the end of 2003 for employees with at least ten years at the company. The simple average seldom dips below 90 percent for workers between fifty and sixty-five years of age. Dollar-weighting the averages yields similar results.

Company C has more complicated diversification rules. Employees younger than fifty-five can diversify up to 50 percent of the employer stock balances in their match accounts if they have ten years of plan participation. Employees aged fifty-five to fifty-nine can also diversify up to 50 percent but need have only five years of plan participation to do so. Employees between the ages of 60 and $70\frac{1}{2}$ can diversify 100 percent of their employer stock balances if they have five years of plan participation. Finally, employees over age $70\frac{1}{2}$ can sell all their employer stock regardless of their time in the plan.

Figure 2 plots average employer stock holdings in match balances at company C at the end of 2002 against tenure in the plan for employees less than fifty-five years of age. The middle left panel in figure 1 plots average

Figure 2. Shares of Employer Match 401(k) Balances Held in Employer Stock at Company C, by Employee Tenure, December 31, 2002[a]

Percent

Tenure in 401(k) plan (years)

Source: Authors' calculations using data from Hewitt Associates.
a. Includes only employees aged fifty-five and older.
b. Aggregate employer stock balances in employer match accounts divided by aggregate employer match account balances.
c. Share consistent with maximum possible diversification allowed under company policy: participants under age fifty-five at this company are allowed to diversify 50 percent of their employer stock holdings after ten years of plan participation.
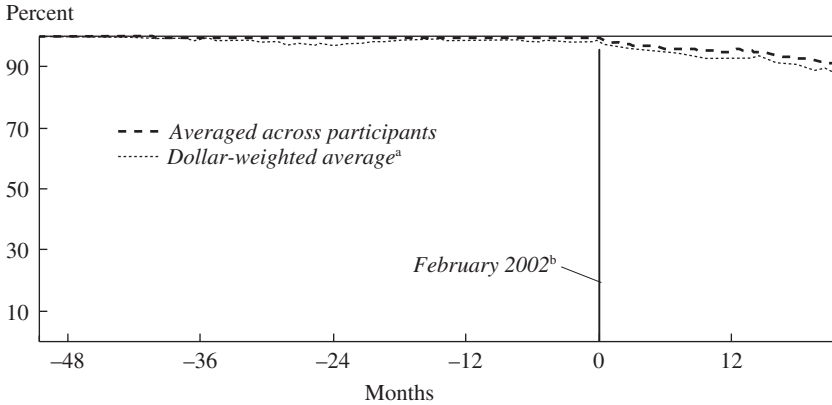
holdings against age for employees at the same company who are between fifty-five and seventy and have at least five years of tenure in the plan. It is apparent that, despite greatly relaxed holding constraints, most employees at this company continued to hold more than 90 percent of their match balances in employer stock years after they became eligible to diversify.

Rule Changes That Relax Diversification Restrictions for All Employees

Figures 1 and 2 suggest that allowing employees to diversify their 401(k) holdings has only a modest impact on actual diversification. However, the complexity of the diversification eligibility schedules may have confused employees, reducing diversification. Companies that completely eliminate diversification restrictions for *all* employees may see greater divestiture of employer stock. Here we study two companies that implemented such a change.

The first, company D, adhered to the standard ESOP diversification requirements (with the results analyzed in figure 1) until early 2002, when it eliminated all diversification restrictions. The company's match, however,

**Figure 3. Shares of Employer Match 401(k) Balances Held in Employer Stock
at Company D before and after Diversification Restrictions Were Lifted**

Percent

Source: Authors' calculations using data from Hewitt Associates.
a. Aggregate employer stock balances in employer match accounts divided by aggregate employer match account balances.
b. Company adhered to the standard ESOP diversification requirements (see figure 1) until February 2002, when it eliminated all restrictions on employer stock diversification.

continued to be directed to employer stock following this plan change. Employees who wanted to maintain a portfolio free of employer stock had to initiate trades on an ongoing basis as new matching contributions were made.

Figure 3 shows the fraction of the employer match account held in employer stock at company D from January 1998 through November 2003. Before the plan change, almost all employer match balances stayed in employer stock. This is not surprising, given that only 6.6 percent of employees met the standard ESOP age and tenure requirements for any diversification. After the 2002 rule change, the allocation to employer stock fell, but very slowly. At the end of 2003, almost two years after the diversification restrictions were lifted, 84 percent of match balances were still in employer stock.

Company E eliminated all diversification restrictions in mid-2002. It, too, continued to direct employer match contributions to employer stock. Unfortunately, lack of appropriate data prevents us from producing the analogue of figure 3 for company E. Instead the bottom left panel of figure 1 shows diversification by age at the end of 2003, approximately eighteen months after the diversification restrictions were lifted. At this

time the average participant under age fifty still had 90 percent of his or her employer match balances in employer stock, and older employees continued to hold over 80 percent of their match balances in employer stock. There is more diversification on a dollar-weighted basis, especially among older participants.

The five case studies presented here paint a consistent picture: relaxing diversification requirements decreases employer stockholding, but the magnitude of that reduction is modest, especially for younger employees.
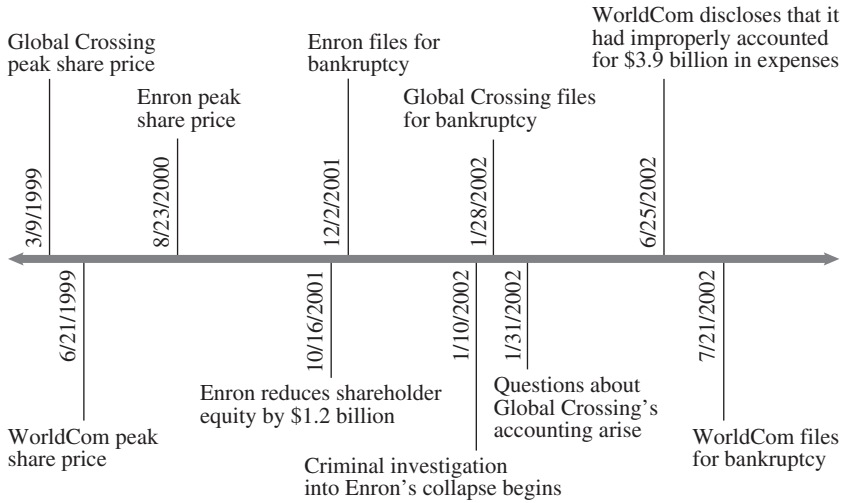
Education: The Effect of Enron, WorldCom, and Global Crossing

If giving employees the ability to diversify does not prompt them to do so, perhaps educating them on the perils of underdiversification will spur them to action. Six of the twenty-one proposed bills listed in appendix table A-1 include an educational provision. The studies reviewed in the introduction found that financial education alone generates only small changes in 401(k) outcomes. However, no one to our knowledge has formally studied the effect on plan participants of witnessing the consequences of others' financial follies.

Here we examine whether the media coverage of the plight of employees at Enron, WorldCom, and Global Crossing—three companies frequently mentioned together in news stories on the perils of holding too much employer stock in one's 401(k) account—caused employees at *other* companies to reduce their employer stock holdings. On December 31, 2000, before any of these firms entered serious financial distress, 62, 32, and 29 percent of 401(k) assets were held in employer stock at Enron, WorldCom, and Global Crossing, respectively, according to the companies' Form 5500 filings and their 11-K filings with the Securities and Exchange Commission. Figure 4 gives a timeline of the key events leading up to the demise of these companies. For the purposes of our analysis, the first "Enron event" was the $1.2 billion reduction in Enron shareholder equity that occurred on October 16, 2001.

We construct a series of variables to capture the amount of media coverage surrounding the financial collapses of Enron, WorldCom, and Global Crossing. These variables are based on the number of news stories mentioning the three companies published each day starting on October 16, 2001. We employ four different counts. The first is the number of stories

Figure 4. Timeline of the Financial Collapses of Enron, WorldCom, and Global Crossing[a]

published in five major newspapers: the *New York Times,* the *Wall Street Journal,* the *Washington Post,* the *Los Angeles Times,* and the *Chicago Tribune.* We used the Lexis/Nexis and Factiva databases to search these publications, and we excluded republished news, recurring pricing and market data, obituaries, sports news, and calendars. We examined the resulting list of stories by hand and deleted results that appeared to be duplicates as well as stories fewer than 100 words long (mostly one-paragraph teasers pointing to stories elsewhere in the paper). The second count includes both these newspaper stories and stories found in Lexis/ Nexis transcripts of television news programs on three major broadcast networks: ABC, CBS, and NBC.[27] There were 12,047 relevant newspaper stories and 1,927 relevant television stories from October 16, 2001, to December 31, 2003. The third and fourth counts exclude from the first and second, respectively, all stories that do not include the word "401(k)."

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27. The transcripts were limited to national news programs (such as the *CBS Evening News, Nightline,* and *20/20*); transcripts of local news broadcasts were not available.

Table 3. News Stories on Enron, WorldCom, and Global Crossing, October 16, 2001, to December 31, 2003

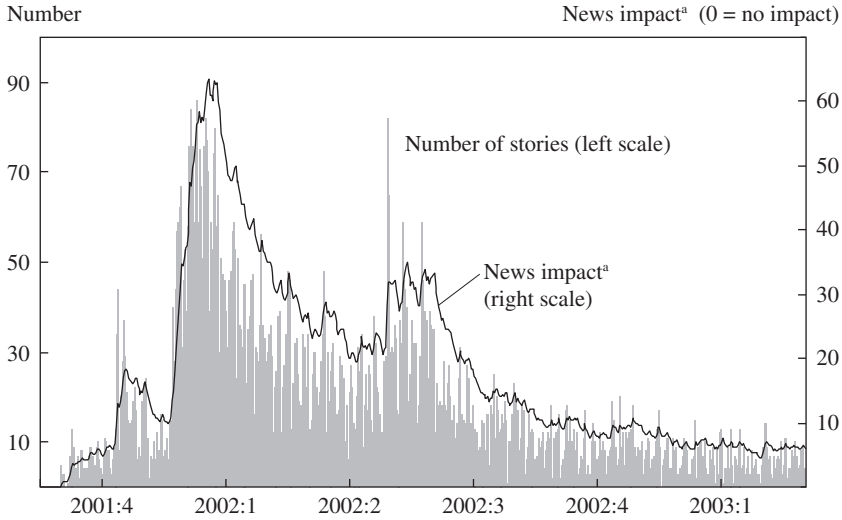| Medium	All stories		Stories mentioning "401(k)" only	
	Days with stories	*Total story count*	*Days with stories*	*Total story count*
Newspapers				
New York Times	639	3,134	125	184
Wall Street Journal	534	3,294	115	157
Washington Post	681	2,374	134	176
Los Angeles Times	712	2,567	112	133
Chicago Tribune	327	678	86	111
Television				
ABC News	182	700	26	37
NBC News	163	459	37	55
CBS News	246	768	43	52
All newspapers	810	12,047	332	761
All television	322	1,927	79	144
All newspapers and television	810	13,974	344	905

Source: Lexis/Nexis and Factiva databases.

This reduces the total number of stories to 761 for the newspapers-only count and 905 for the television-plus-newspapers count. Table 3 provides a breakdown of these totals by individual source. Our constructed variables serve only as proxies for the *millions* of items on Enron, WorldCom, and Global Crossing that appeared in local and national newspapers and magazines and on websites, radio, and television.

Using these four news story counts, we created four geometrically time-discounted news impact variables to capture the fact that reaction to news does not occur immediately. The impact of each story is assumed to decay by a factor δ for each day after its publication or broadcast. We multiply the product by $(1 - \delta)$ so that the mean value of the news impact variables is invariant to the value of δ. Thus, for example, a story published on January 2 would receive a weight of $(1 - \delta)$ on that day, a weight of $\delta(1 - \delta)$ on January 3, a weight of $\delta^2(1 - \delta)$ on January 4, and so on. The impact of all stories on day t (where $t = 0$ on October 16, 2001) is the sum of the geometrically discounted impact of all previous stories:

$$\text{news impact}_t = (1 - \delta) \sum_{p=0}^{t} \delta^{t-p} N_p,$$

Figure 5. Newspaper Stories on Enron, WorldCom, and Global Crossing and Corresponding News Impact Variable, October 2001 to May 2003

Number   News impact[a] (0 = no impact)

Sources: Lexis/Nexis and Factiva and authors' calculations.
a. Assumed news impact decay parameter $\delta = 0.9$.

where N_p is the number of stories published on day p. Because we have little theoretical or empirical guidance on the appropriate value of δ, we try a range of values.

Figure 5 shows the number of relevant newspaper stories published on each day, as well as the value of the news impact variable constructed from those data using a value of $\delta = 0.9$. The most active news coverage occurred from mid-December 2001 through the end of February 2002, when Enron and Global Crossing filed for bankruptcy. There is another peak in June and July 2002, when WorldCom disclosed accounting irregularities and shortly thereafter filed for bankruptcy.

Having created a proxy for media attention, we estimate its association with 401(k) employer stockholding in two domains. First we study its effect on aggregate 401(k) employer stockholding, using data on 401(k) participants in a number of large firms. However, some of these employees may have been required to hold employer stock by their companies or may not have had employer stock available as a 401(k) investment option. Therefore we also analyze two specific companies that offered employer

stock but had no diversification restrictions. We then examine whether workers in Texas—and, even more specifically, Houstonians—reacted more to the Enron bankruptcy than did workers outside of Texas. Because Enron is headquartered in Houston, workers in Houston and Texas were exposed to more Enron media coverage and were more likely to have known people directly affected by the bankruptcy.

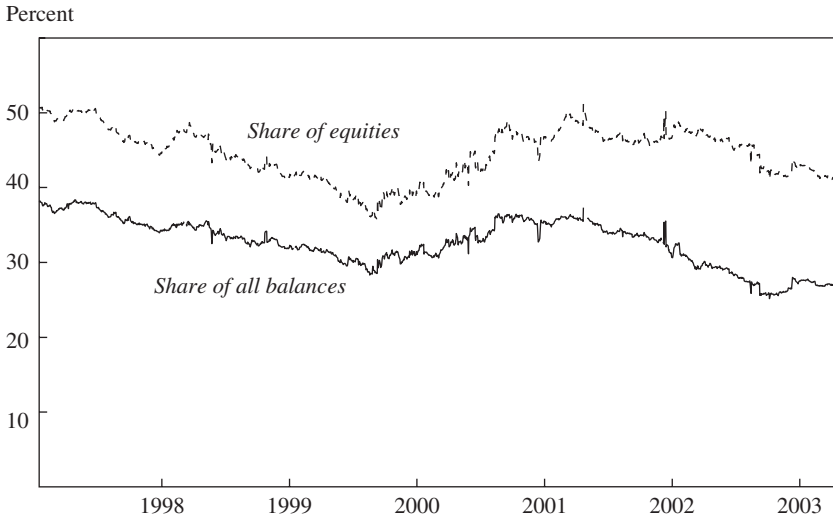### The Effect of News about Enron, WorldCom, and Global Crossing on Aggregate Employer Stock Holdings

Our aggregate employer stock data come from the Hewitt 401(k) Index, which measures daily trading activity in a large number of firms that collectively employ 1.5 million participants with nearly $90 billion in 401(k) assets.[28] Our Hewitt Index data run from August 4, 1997, through November 4, 2003 (seventy-five months). Because the set of firms represented in the index changes over time, we restrict our attention to the subset that are in the index for the entire sample period. These firms hold approximately half the 401(k) assets of all firms in the index.

For these firms figure 6 shows both the fraction of total 401(k) assets and the fraction of equities held in employer stock. The former ranges from 26 to 38 percent, which is higher than the 19 percent calculated by Holden and VanDerhei using a much larger database.[29] This discrepancy probably results from the fact that firms in the Hewitt Index tend to be very large, and large firms are more likely to offer employer stock as an investment option. The fraction of equities in employer stock ranges from 36 to 51 percent over the same period.

The share of all assets in employer stock shows a declining trend from August 1998 through March 2000, an increasing trend from March 2000 through May 2001, relative stability from May through November 2001, and a declining trend from November 2001 through November 2003. The beginning of that last declining trend coincides with the financial collapse of Enron. On October 15, 2001, the day before Enron's shareholder equity fell by $1.2 billion, the fraction of total balances in employer stock at

28. Hewitt Associates (undated-a, undated-b). Historical values for the index can be found at was4.hewitt.com/hewitt/services/401k/index.htm. We do not use the index itself but only certain inputs into the index.

29. Holden and VanDerhei (2001); VanDerhei (2002). They use the EBRI/ICI database compiled by the Employee Benefit Research Institute and the Investment Company Institute.

Figure 6. Shares of Total 401(k) Balances Held in Employer Stock, 1997–2004[a]

Percent

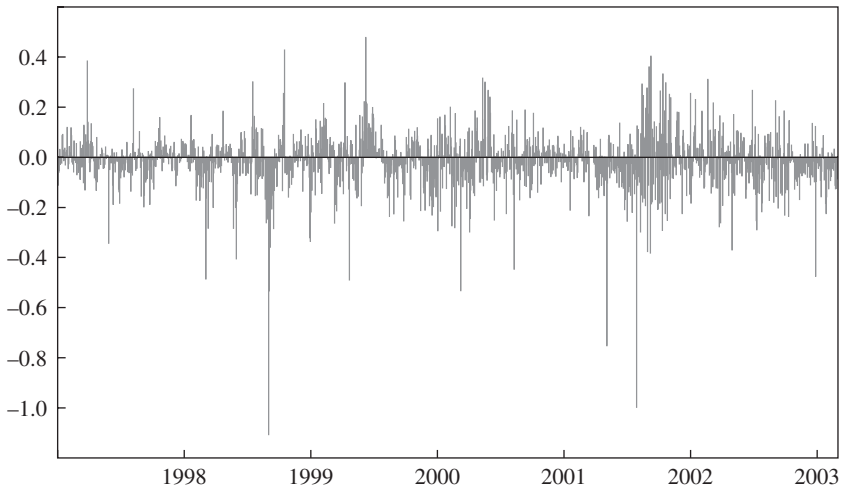Source: Authors' calculations based on data from Hewitt Associates.
a. Data are for only those firms that are in the Hewitt Index for the whole sample period.

Hewitt Index firms was 35.9 percent. By April 2003 it had reached a low of 25.8 percent. However, a broader stock market decline began around the same time, and this would have mechanically reduced the fraction of 401(k) assets held as employer stock even if employees were completely passive.

If the decline in employer stock holdings were completely mechanically driven by a general decline in stock prices, then employer stock as a fraction of *equities* should not be greatly affected, because both the numerator and the denominator in this fraction would decrease by roughly the same proportion. Figure 6 shows, however, that this series is not flat over the post-Enron period, but the decline is much less pronounced than that for employer stock as a fraction of all balances. Indeed, it is striking that employer stock as a fraction of equity holdings barely moved during the time that the Enron scandal was unfolding. However, this stable ratio need not be due to a lack of trading in employer stock; plan participants could have aggressively sold both employer stock and other equities. With such concerns in mind, we turn to an analysis of trading activity in employer stock.

Figure 7. Daily Net Transfers of Employer Stock in 401(k)s, August 1997 to July 2003

Percent of preceding day's employer stock balance

Source: Authors' calculations using data from Hewitt Associates.

Our dependent variable is the value of aggregate net transfers into or out of employer stock, normalized by dividing by the preceding day's aggregate employer stock balance.[30] This variable will be positive when the total dollars transferred into employer stock exceeds the total dollars transferred out, and zero or negative otherwise. Figure 7 plots normalized net transfers over our sample period.[31] Casual visual inspection indicates that net trading volatility seems to have increased following Enron's collapse, but the mean direction of trade does not obviously shift.

To isolate the impact of the financial collapse of Enron, WorldCom, and Global Crossing on employer stock trading, we regressed normalized net employer stock transfers on the news impact variable, current and lagged

30. Dollars traded includes only balances that are actively transferred from one investment option to another. It does not include payroll contributions that are invested in employer stock, nor does it include withdrawals out of the plan entirely.

31. Occasionally, large changes in employer stock balances were observed because data for certain component companies were missing on those days, generating outliers in the calculated normalized trading activity. We eliminated such outlier days from our data.

market returns on the Standard and Poor's 500 stock index (calculated so that the returns are nonoverlapping),[32] day-of-the-week dummies, and a cubic polynomial time trend (in annualized trading days). Table 4 reports least-squares regression results using the four different versions of the news impact variable and δ values of 0.25 and 0.9.

The coefficients on the news impact variable are negative and statistically significant across all specifications, indicating that trading out of employer stock occurred in response to media attention to the Enron, WorldCom, and Global Crossing episodes. We calculate the total media-induced decline in employer stock holdings as a fraction of 401(k) balances using the formula

$$(1) \qquad \sum_{t=0}^{T-1} \beta \times \text{news impact}_t \times \text{employer stock percent}_{t-1},$$

where β is the regression coefficient on the news impact variable, employer stock percent$_{t-1}$ is the fraction of total balances held in employer stock on day $t-1$, and $T-1$ is the total number of post-Enron trading days in our sample. The last row of table 4 shows the calculated economic magnitudes for each specification.[33] No matter how we defined a news story as relevant, and regardless of the δ value chosen, none of the specifications show that more than a 2.4-percentage-point drop in employer stock holdings as a fraction of the total portfolio can be attributed to news about Enron, WorldCom, and Global Crossing.[34] The coefficients become more negative when all stories rather than just 401(k) stories are included, but they attenuate when we broaden our media sources to include television. There is no consistent pattern with respect to δ values. The small economic magnitudes also hold in regressions (results not reported) that use other definitions of the story variable (for example, *New York Times* stories only,

32. The S&P return variables are the returns today, yesterday, last month, the last six months, and the last one, two, three, and four years. The short-horizon return variables allow us to control for transfers due to day traders.

33. Note that the coefficients across regressions where the story counts differ are not directly comparable, because the average magnitude of the news impact variable differs. The economic magnitudes, not the coefficients themselves, should be used to compare effects.

34. We also ran regressions including a post-Enron dummy variable to see if there was a discrete drop in employer stock holdings once the Enron scandal broke. We did not find any statistically significant or economically large coefficients, and the coefficient signs often indicated that the Enron scandal caused a small movement *into* employer stock.

Table 4. Effect of News about Enron, WorldCom, and Global Crossing on Net Employer Stock Transfers, August 4, 1997, to November 4, 2003[a]

| | All stories | | | | Stories mentioning "401(k)" only | | | |
| | δ = 0.25 | | δ = 0.90 | | δ = 0.25 | | δ = 0.90 | |
Independent variable	Newspapers only	Newspapers and TV	Newspapers only	Newspapers and TV	Newspapers only	Newspapers and TV	Newspapers only	Newspapers and TV
News impact[b]	−0.0008***	−0.0007**	−0.0008*	−0.0006*	−0.0075	−0.0057*	−0.0107**	−0.0087**
	(0.0003)	(0.0002)	(0.0004)	(0.0003)	(0.0035)	(0.0024)	(0.0041)	(0.0032)
Return on S&P500[c]								
Same day	−0.0149***	−0.0150**	−0.0148***	−0.0148*	−0.0148**	−0.0149**	−0.0148**	−0.0148**
	(0.0026)	(0.0026)	(0.0027)	(0.0027)	(0.0027)	(0.0027)	(0.0026)	(0.0026)
Preceding day	−0.0028	−0.0029	−0.0027	−0.0027	−0.0027	−0.0027	−0.0027	−0.0027
	(0.0023)	(0.0023)	(0.0024)	(0.0024)	(0.0023)	(0.0023)	(0.0023)	(0.0023)
Preceding month	−0.0013	−0.0012	−0.0012	−0.0012	−0.0012	−0.0012	−0.0012	−0.0012
	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)

(*continued*)

177

Table 4. **Effect of News about Enron, WorldCom, and Global Crossing on Net Employer Stock Transfers, August 4, 1997, to November 4, 2003ᵃ** (*continued*)

	All stories				Stories mentioning "401(k)" only			
	δ = 0.25		δ = 0.90		δ = 0.25		δ = 0.90	
Independent variable	*Newspapers only*	*Newspapers and TV*	*Newspapers only*	*Newspapers and TV*	*Newspapers only*	*Newspapers and TV*	*Newspapers only*	*Newspapers and TV*
*Time trend*ᵈ								
Linear	0.0150	0.0140	0.0205	0.0209	0.0153	0.0151	0.0156	0.0160
	(0.0450)	(0.0450)	(0.0418)	(0.0417)	(0.0449)	(0.0449)	(0.0317)	(0.0315)
Quadratic	−0.0100	−0.0096	−0.0106	−0.0106	−0.0097	−0.0096	−0.0100	−0.0101
	(0.0173)	(0.0173)	(0.0168)	(0.0167)	(0.0173)	(0.0173)	(0.0140)	(0.0139)
Cubic	0.0011	0.0011	0.0009	0.0009	0.0011	0.0011	0.0011	0.0011
	(0.0014)	(0.0014)	(0.0015)	(0.0015)	(0.0014)	(0.0014)	(0.0014)	(0.0013)
Intercept	0.0370	0.0341	0.0589	0.0593	0.0262	0.0254	0.0302	0.0300
	(0.0502)	(0.0504)	(0.0402)	(0.0399)	(0.0509)	(0.0509)	(0.0316)	(0.0316)
Adjusted R^2	0.0821	0.0825	0.0814	0.0818	0.0826	0.0826	0.0830	0.0834
Total news effectᵉ	−2.35	−2.22	−2.00	−1.90	−1.30	−1.20	−1.79	−1.74

Source: Authors' calculations.
a. The dependent variable is aggregate net transfers of employer stock in 401(k) plans, as a percentage of the preceding day's employer stock balance. The unit of observation is a trading day. The sample size in all regressions is 1,534. All regressions include day-of-the-week dummies, month-of-the-year dummies, and additional stock market return controls extending back four years. Numbers in parentheses are Newey-West (1987) standard errors with five lags. * denotes statistical significance at the 5 percent level, and ** at the 1 percent level.
b. See the text for definition.
c. In percentage points.
d. Time is measured in years.
e. Calibrated percentage-point reduction in the fraction of the total portfolio allocated to employer stock due to the aggregate effect of the news impact variable over the sample period.

or stories about Enron only), that use other values of δ, that exclude the trend variables, that use data aggregated to the monthly level, or that use a distributed lag specification for the impact of news rather than a geometrically decaying specification.[35]

If a large fraction of Hewitt Index firms do not offer employer stock in their 401(k), or if many employees in those firms are unable to diversify because of holding restrictions, then the aggregate results in table 4 will significantly understate the true effect of media education on employer stock holdings. Unfortunately, we do not know anything about the prevalence of employer stock availability or holding restrictions among the companies in the Hewitt Index. However, a 2003 Hewitt Associates survey that collected data on various aspects of 401(k) plan design from approximately 450 large firms reports that 49 percent of these firms offered employer stock as an investment option.[36] Of those that offered employer stock, 78 percent either had no diversification restrictions for matching contributions directed into employer stock or did not match in employer stock. If the Hewitt Index companies are similar to this sample of firms, and if we assume counterfactually that *none* of the employer stock reduction occurred in companies with holding restrictions, and if the specification that yields the most negative news impact coefficient is correct, then the media coverage of Enron, WorldCom, and Global Crossing caused employer stock holdings to drop by at most $2.35/0.49 \times 0.78 = 6.15$ percentage points in companies without holding restrictions, still a small effect. In reality, most employees at firms with holding restrictions are *not* constrained at the margin by the restrictions, because they hold so much employer stock in the accounts over which they have full discretion. Holden and VanDerhei report that employees with holding requirements invest 33 percent of their own contributions in employer stock, whereas employees without holding requirements invest 22 percent of their entire 401(k) portfolio in employer stock.[37] Therefore 6.15 percentage points is an upper bound on the true effect. The magnitude of this effect is consistent with other estimates of financial education we have reported elsewhere,

35. When lags of N_p are included in the regression, only the preceding day's lag is statistically significant. As so often in empirical exercises, we cannot rule out the existence of omitted variable bias, despite the robustness of our results to various specifications.

36. Hewitt Associates (2003).

37. Holden and VanDerhei (2001).

and with the finding by Esther Duflo and Emmanuel Saez that financial education motivates only small changes in 401(k) saving behavior.[38]

The Effect of News on Companies Offering Employer Stock without Diversification Restrictions

To further investigate the hypothesis that holding requirements prevented a dramatic aggregate fall in employer stock holdings following the Enron, WorldCom, and Global Crossing scandals, we study two large firms offering employer stock in their 401(k)s for which we have daily trading data. The first, company D, had employer stock holding requirements in the employer match account for most of the sample period (see above). For this reason we examine only the employee contribution account for company D, where there were no such restrictions. The second, company F, had no holding requirements anywhere in its 401(k) plan. In addition, employer matching contributions at company F were not directed into employer stock; rather, their allocation mirrored that which employees chose for their own contributions.

Figure 8 plots the fraction of employee contribution balances held in employer stock from 1997 through 2003 for company D. Employer stock holdings declined in the early post-Enron period (October 2001 through January 2002) but increased for most of the period after that, including the time of greatest Enron-related media attention (January through March 2002). These patterns track the company's stock price. Taken by itself, this figure does not suggest that the employees of company D responded to news about Enron, WorldCom, and Global Crossing.

Figure 9 plots for company D the average fraction of employee contribution flows that went to employer stock on each date, with and without weighting by dollar value. We examine these series because employees who have decided to permanently decrease their employer stock holdings may begin by stanching the flow into employer stock that occurs at each payroll date. In fact, the allocations steadily increased over time and show only slight declines in the immediate wake of the Enron scandal before continuing their march upward. There is thus little evidence of significant adjustment on the contribution flow margin.

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38. Choi and others (2002); Choi, Laibson, and Madrian (2005a); Duflo and Saez (2003).

Figure 8. Share of Employee Contribution 401(k) Balances Held in Employer Stock at Company D, November 1997 to December 2003
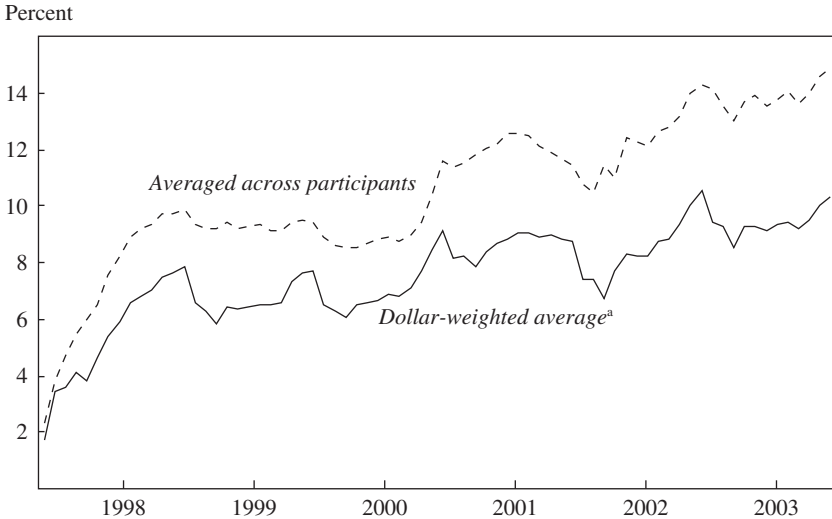
Percent

Source: Authors' calculations using data from Hewitt Associates.

Figure 10 plots daily net transfers of employer stock at company D as a fraction of the previous day's employer stock balance. We begin the sample in November 1997 because that is when the plan first allowed trading on a daily rather than a monthly basis. The magnitude of normalized net trade flows is larger than that observed in the Hewitt Index, but this is to be expected. An individual company's net trade flow will have a substantial idiosyncratic component, which will be averaged away when aggregated with many other companies in the Hewitt Index.

Table 5 shows the results of regressing this series on the news impact variable and several control variables, including those used in the previous subsection.[39] We find that, across all specifications, the largest news-induced drop in employer stock holdings is a statistically insignificant

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39. We control for employer stock returns in excess of the S&P 500. Like Choi and others (2004b), we find that positive excess employer stock returns cause trading out of employer stock. We also add a dummy variable for the date when diversification restrictions on the match account were lifted at the company.

Figure 9. Shares of Employee 401(k) Contributions Allocated to Employer Stock at Company D, November 1997 to December 2003

Source: Authors' calculations using data from Hewitt Associates.
a. Aggregate employer stock balances in employer match accounts divided by aggregate employer match account balances.
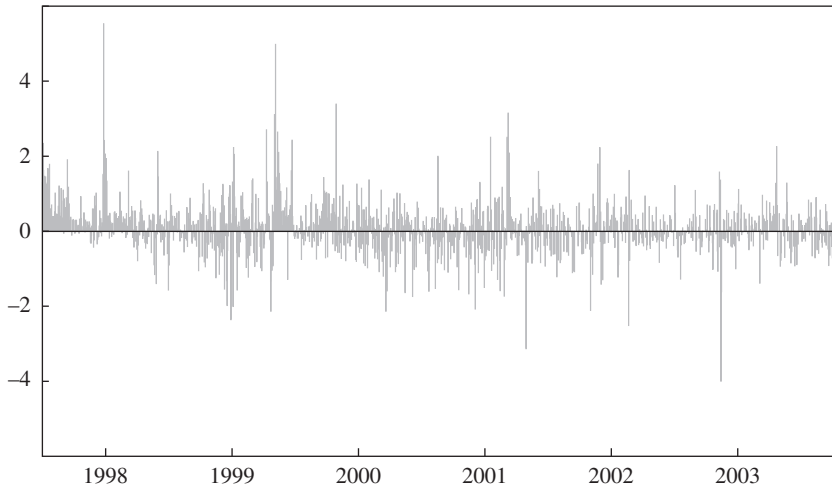
1.21 percent of employee contribution balances.[40] When δ is set to 0.9, the regression results suggest that news of the major bankruptcies caused company D employees to trade *into* employer stock. Since we are studying accounts with no diversification restrictions, we can conclude that employees did not trade out of employer stock even in accounts in which they had every opportunity to do so.[41]

40. The coefficients in this regression and in the company F regression below are not directly comparable to those in the Hewitt Index regression, because the total economic effect depends upon the initial fraction of the portfolio held in employer stock, which differs across the three samples. The time trends should also not be expected to be similar across the three sets of regressions, because of firm-specific trends that are averaged away in the aggregate series.

41. The economic effect of one of the *control* variables in these regressions is anomalously large. The coefficients on the linear time trend imply a 60-percentage-point drop in employer stock holding due to the time trend. Since this would result in a negative average employer stock position in the absence of other forces, we do not interpret this magnitude literally but consider it an artifact of a nonlinearity (see figure 8) that is not well fit by a cubic polynomial.

Figure 10. Daily Net Transfers of Employer Stock in 401(k)s at Company D, November 1997 to March 2003

Percent of preceding day's employer stock balance

Source: Authors' calculations using data from Hewitt Associates.

Figure 11 plots the fraction of total 401(k) account balances held in employer stock over time at company F, which had no holding restrictions on either the employee contribution or employer match balances. There are two complications with the company F data. First, company F allows its participants to put their 401(k) assets in a self-directed brokerage window, where they can trade securities not offered in the company's 401(k) investment menu. We do not observe daily balances in the self-directed window and thus cannot include them in the daily total balances we calculate. (We do, however, observe the self-directed window balances at the end of each year.) Therefore figure 11 overstates the fraction of all 401(k) balances allocated to employer stock. Because we observe total employer stock balances each day, our trading regressions will not be affected by this data issue. Second, our company F sample does not start until January 2002, which means that we do not observe pre-Enron behavior at this company. Therefore our estimates of the news effect at company F may be less reliable.

Figure 12 shows that, over the entire sample period, the fraction of contribution flows that participants at company F directed to employer stock

Table 5. Effect of News about Enron, WorldCom, and Global Crossing on Net Employer Stock Transfers at Company D, December 1, 1997, to December 31, 2003[a]

	All stories				Stories mentioning "401(k)" only			
	$\delta = 0.25$		$\delta = 0.90$		$\delta = 0.25$		$\delta = 0.90$	
Independent variable	Newspapers only	Newspapers and TV	Newspapers only	Newspapers and TV	Newspapers only	Newspapers and TV	Newspapers only	Newspapers and TV
News impact[b]	−0.0017	−0.0012	0.0021	0.0013	−0.0037	−0.0141	0.0336	0.0139
	(0.0025)	(0.0017)	(0.0047)	(0.0032)	(0.0241)	(0.0183)	(0.0421)	(0.0324)
Company D excess return[c]								
Today	−0.0758**	−0.0758**	−0.0761**	−0.0761**	−0.0759**	−0.0758**	−0.0762**	−0.0761**
	(0.0229)	(0.0229)	(0.0228)	(0.0228)	(0.0230)	(0.0229)	(0.0229)	(0.0228)
Previous day	−0.0193*	−0.0193*	−0.0194*	−0.0194*	−0.0194*	−0.0193*	−0.0195*	−0.0194*
	(0.0086)	(0.0086)	(0.0085)	(0.00085)	(0.0086)	(0.0086)	(0.0085)	(0.0085)
Previous month	−0.0051*	−0.0051*	−0.0052*	−0.0052*	−0.0051*	−0.0051*	−0.0054*	−0.0052*
	(0.0024)	(0.0024)	(0.0024)	(0.0024)	(0.0024)	(0.0024)	(0.0024)	(0.0024)
Return on S&P500[d]								
Today	−0.0970**	−0.0971**	−0.0967**	−0.0966**	−0.0969**	−0.0970**	−0.0970**	−0.0967**
	(0.0190)	(0.0190)	(0.0190)	(0.0190)	(0.0189)	(0.0189)	(0.0190)	(0.0190)
Previous day	−0.0414**	−0.0415**	−0.0410**	−0.0409**	−0.0412**	−0.0412**	−0.0413**	−0.0411**
	(0.0137)	(0.0137)	(0.0137)	(0.0137)	(0.0137)	(0.0137)	(0.0137)	(0.0137)

Previous month	-0.0032	-0.0030	-0.0030	-0.0029	-0.0032	-0.0031	-0.0031
	(0.0055)	(0.0053)	(0.0054)	(0.0054)	(0.0054)	(0.0053)	(0.0053)
Time trend[e]							
Linear	-0.8247**	-0.8292**	-0.8277**	-0.8281**	-0.8134**	-0.8664**	-0.8369**
	(0.3133)	(0.3055)	(0.3053)	(0.3136)	(0.3144)	(0.3070)	(0.3074)
Quadratic	0.2511	0.2653	0.2650	0.2530	0.2457	0.2824	0.2687
	(0.1661)	(0.1662)	(0.1621)	(0.1661)	(0.1665)	(0.1631)	(0.1632)
Cubic	-0.0195	-0.0234	-0.0234	-0.0198	-0.0188	-0.0251	-0.0238
	(0.0185)	(0.0184)	(0.0184)	(0.0185)	(0.0185)	(0.0185)	(0.0185)
Diversification dummy[f]	0.2484	0.1945	0.2103	0.2272	0.2251	0.1864	0.2209
	(0.1338)	(0.1689)	(0.1531)	(0.1302)	(0.1240)	(0.1528)	(0.1443)
Intercept	0.3867	0.5650	0.5467	0.3839	0.3825	0.5488	0.5659
	(0.7065)	(0.5215)	(0.5229)	(0.7077)	(0.7058)	(0.5222)	(0.5249)
Adjusted R^2	0.1766	0.1767	0.1766	0.1765	0.1765	0.1771	0.1767
Total news effect[g]	-1.21	1.35	0.99	-0.15	-0.68	1.33	0.65

Source: Authors' calculations.

a. The dependent variable is aggregate net employer stock transfers in the employee contribution account, as a percentage of the preceding day's employer stock balance. The unit of observation is a trading day. The sample size in all regressions is 1,520. All regressions include day-of-the-week dummies, month-of-the-year dummies, and additional stock market return controls extending back four years. Numbers in parentheses are Newey-West standard errors with five lags. * denotes significance at the 5 percent level, and ** at the 1 percent level.

b. See the text for definition.

c. Annual rate of return on company stock in excess of the return on the S&P 500, in percentage points.
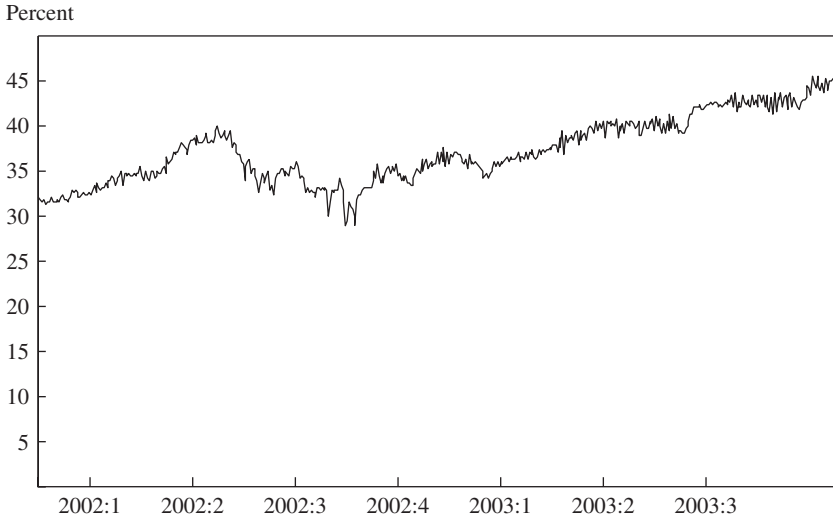
d. In percentage points.

e. Time is measured in years.

f. Equals 1 if the date of transfer is after the employer began to allow for full diversification of matching contributions for all employees.

g. Calibrated percentage-point change in the fraction of the total portfolio allocated to employer stock due to the aggregate effect of the news impact variable over the sample period.

185

Figure 11. Share of Total 401(k) Balances Held in Employer Stock at Company F, January 2002 to December 2003ª

Percent

Source: Authors' calculations using data from Hewitt Associates.
a. Excludes balances held in self-directed brokerage accounts within the company's plan.

slowly increased, even during the post-Enron period. This corresponds to the pattern in figure 11, which showed an increasing share of balances held in employer stock over time. As at company D, there is no evidence of Enron-induced adjustment in the contribution flow allocations.
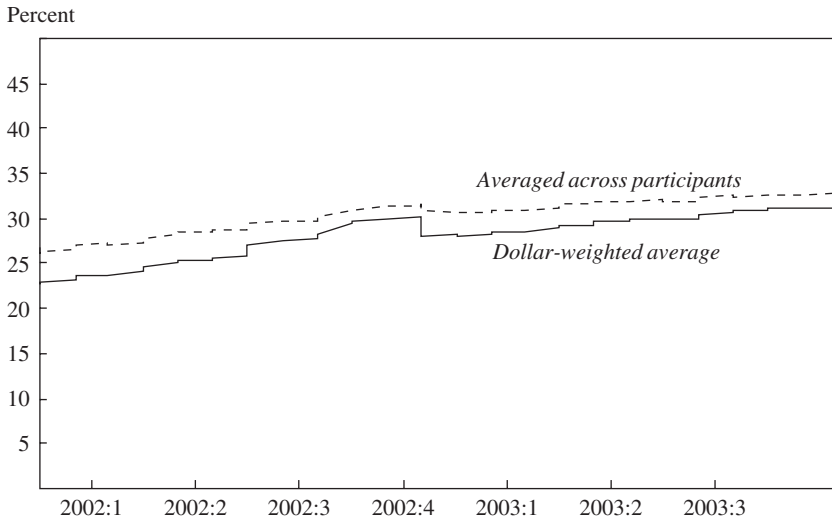
Figure 13 plots company F's daily net transfers of employer stock as a fraction of the preceding day's employer stock balance. Table 6 shows the news impact regression results. In calculating the economic effect, we modify equation 1 to reflect the fact that we do not observe total 401(k) balances each day, but only at the end of each year. Our alternative formula is

$$(2) \qquad \frac{\sum_{t=\tau_0}^{T_0} \beta \times \text{news impact}_t \times \text{employer stock balances}_{t-1}}{\text{total year-end 2003 401(k) balances}},$$

where τ_0 is January 1, 2002, and T_0 is the number of trading days for which we have transactions data for company F.[42] We find that the largest

42. We have data on employer stock balances for company F as of December 31, 2001, from the cross-sectional data.

Figure 12. Shares of Employee 401(k) Contributions Allocated to Employer Stock at Company F, January 2002 to December 2003[a]

Percent

Source: Authors' calculations using data from Hewitt Associates.
a. Aggregate contribution flow allocated to employer stock divided by total aggregate contribution flows.

economic effect of media coverage across all the specifications is a statistically insignificant 5.2-percentage-point decrease. The average estimate is a 1.8-percentage point-decrease.

Overall, our analysis of employer stock trading at companies D and F shows no statistically or economically significant effect of the Enron, WorldCom, and Global Crossing debacles on employees' willingness to hold employer stock, even in accounts not subject to diversification restrictions.

Impact on Texas Employees Versus Non-Texas Employees

The Enron scandal is more likely to have been salient to workers living in Texas than those living outside Texas. Not only was local news coverage likely to have been more active, but residents of Texas are more likely to have known Enron employees or friends of Enron employees. About a quarter of Enron's employees worked at the Houston headquarters, and more than half of the company's 8,000 job cuts in 2002 were in Houston. Here we explore whether Texan employees at companies C

Figure 13. Daily Net Transfers of Employer Stock in 401(k)s at Company F, January 2002 to January 2004

Percent of preceding day's employer stock balance

Source: Authors' calculations using data from Hewitt Associates.

and G reduced their employer stock holdings more than did non-Texan employees at the same companies.

Companies C and G are large retail firms chosen for this study because they have a substantial number of employees both in and outside of Texas. Company G imposed no diversification restrictions on its employees, although employer matching contributions had to be initially invested in employer stock. Employees who wished to diversify had to initiate a trade periodically, but they were free to do so at any time. We do not have daily transactions data for company G, and so we rely on a different identification strategy than in the previous subsection. We have cross-sectional snapshots of portfolio allocations at the end of each year from 1998 to 2002. We use these snapshots, exploiting the fact that employees rarely change their 401(k) elections after enrolling.[43] Therefore any year-end differences in employer stock holdings between Texans and non-Texans who enrolled at the same time are likely to be due to asset allocation decisions

43. Samuelson and Zeckhauser (1988).

Table 6. Effect of News about Enron, WorldCom, and Global Crossing on Net Employer Stock Transfers at Company F, January 1, 2002, to December 31, 2003[a]

Independent variable	All stories				Stories mentioning "401(k)" only			
	δ = 0.25		δ = 0.90		δ = 0.25		δ = 0.90	
	Newspapers only	Newspapers and TV	Newspapers only	Newspapers and TV	Newspapers only	Newspapers and TV	Newspapers only	Newspapers and TV
News impact[b]	−0.0003	−0.0013	−0.0031	−0.0017	−0.0048	−0.0140	−0.0002	−0.0017
	(0.0041)	(0.0026)	(0.0055)	(0.0036)	(0.0353)	(0.0223)	(0.0513)	(0.0304)
Company F excess return[c]								
Today	−0.2038**	−0.2041**	−0.2038**	−0.2039**	−0.2036**	−0.2032**	−0.1632**	−0.1632**
	(0.0397)	(0.0397)	(0.0397)	(0.0397)	(0.0396)	(0.0396)	(0.0496)	(0.0497)
Previous day	0.0407*	0.0406*	0.0406*	0.0406*	0.0409*	0.0412*	0.1188**	0.1189**
	(0.0204)	(0.0204)	(0.0204)	(0.0204)	(0.0203)	(0.0203)	(0.0371)	(0.0370)
Previous month	0.0019	0.0020	0.0020	0.0020	0.0019	0.0019	−0.0127	−0.0129
	(0.0061)	(0.0062)	(0.0062)	(0.0062)	(0.0061)	(0.0061)	(0.0108)	(0.0108)
Return on S&P500[d]								
Today	−0.1632**	−0.1632**	−0.1628**	−0.1630**	−0.1631**	−0.1631**	−0.2038**	−0.2037**
	(0.0496)	(0.0497)	(0.0496)	(0.0496)	(0.0497)	(0.0498)	(0.0396)	(0.0396)
Previous day	0.1188**	0.1189**	0.1192**	0.1190**	0.1189**	0.1191**	0.0408**	0.0408**
	(0.0369)	(0.0370)	(0.0372)	(0.0371)	(0.0370)	(0.0370)	(0.0204)	(0.0204)
Previous month	−0.0127	−0.0125	−0.0124	−0.0125	−0.0128	−0.0132	0.0019	0.0019
	(0.0108)	(0.0108)	(0.0109)	(0.0108)	(0.0108)	(0.0108)	(0.0061)	(0.0061)

(continued)

189

Table 6. Effect of News about Enron, WorldCom, and Global Crossing on Net Employer Stock Transfers at Company F, January 1, 2002, to December 31, 2003ᵃ (continued)

	All stories				Stories mentioning "401(k)" only			
	δ = 0.25		δ = 0.90		δ = 0.25		δ = 0.90	
Independent variable	Newspapers only	Newspapers and TV	Newspapers only	Newspapers and TV	Newspapers only	Newspapers and TV	Newspapers only	Newspapers and TV
Time trendᵉ								
Linear	−1.2238*	−1.2660*	−1.3465*	−1.2988*	−1.2258*	−1.2397*	−1.2140*	−1.2182*
	(0.5983)	(0.5740)	(0.6503)	(0.6159)	(0.5635)	(0.5548)	(0.6000)	(0.5823)
Quadratic	0.9555	0.9848	1.0106	0.9977	0.9656	1.0081	0.9507	0.9562
	(0.6023)	(0.6029)	(0.6078)	(0.6088)	(0.6054)	(0.6036)	(0.6128)	(0.6129)
Cubic	1.4361*	1.4536*	1.5269*	1.4883*	1.4348*	1.4264*	1.4300*	1.4315*
	(0.6105)	(0.5924)	(0.6453)	(0.6228)	(0.5894)	(0.5843)	(0.6079)	(0.5971)
Intercept	−1.1622	−1.1222	−1.1483	−1.1479	−1.1631	−1.1496	−1.1670	−1.1665
	(0.7088)	(0.7101)	(0.7020)	(0.7020)	(0.6996)	(0.7004)	(0.6980)	(0.6985)
Adjusted R^2	0.2333	0.2334	0.2334	0.2334	0.2333	0.2335	0.2333	0.2333
Total news effectᶠ	−0.48	−2.87	−5.21	−3.32	−0.51	−1.74	−0.02	−0.21

Source: Authors' calculations.

a. The dependent variable is aggregate net employer stock transfers, as a percentage of the preceding day's employer stock balance. The unit of observation is a trading day. The sample size in all regressions is 504. All regressions include day-of-the-week dummies, month-of-the-year dummies, and additional stock market return controls extending back four years. Numbers in parentheses are Newey-West standard errors with five lags. * denotes significance at the 5 percent level, and ** at the 1 percent level.

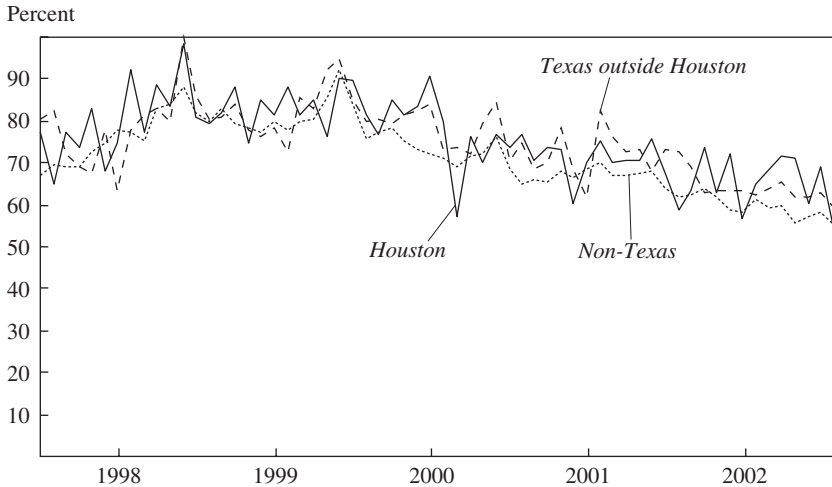b. See the text for definition.

c. Annual rate of return on company stock in excess of the return on the S&P 500.

d. In percentage points.

e. In years.

f. Calibrated percentage-point reduction in the fraction of the total portfolio allocated to employer stock due to the aggregate effect of the news impact variable over the sample period.

Figure 14. Shares of 401(k) Balances Held in Employer Stock by New Plan Participants at Company G, by Initial Participation Date and Location, January 1998 to January 2003[a]

Percent

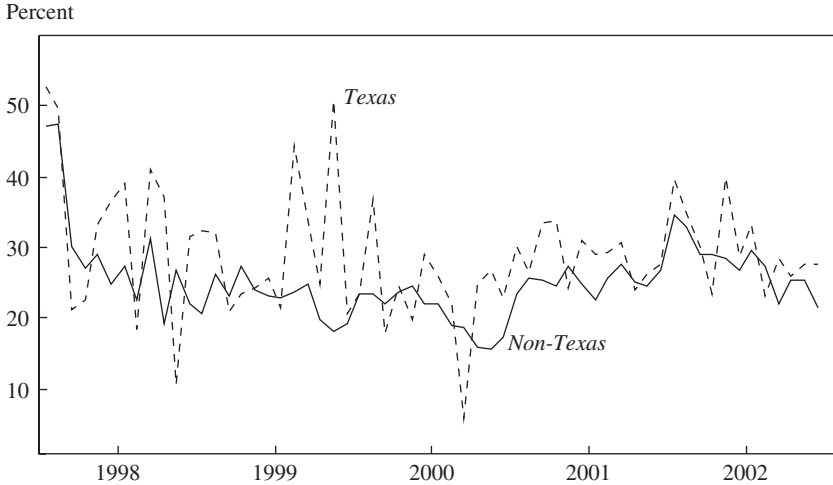Source: Authors' calculations using data from Hewitt Associates.
a. Allocations are measured at the end of the year in which the participant enrolled.

made at the time of enrollment. We investigate whether Texans who enrolled in the post-Enron period show an increasing tendency to deviate from non-Texans' employer stock allocations.

Figure 14 graphs the fraction of total balances held in employer stock against enrollment date for three groups of employees at company G: those living in the greater Houston metropolitan area (Harris County), those living outside of greater Houston but in Texas, and those living outside of Texas. The portfolio allocation is taken from the first year-end snapshot after the employee's enrollment date. This figure shows that the asset allocations of all three groups track each other fairly closely. There is no greater tendency for either Houstonians or Texans to reduce their employer stock holdings in the wake of the Enron scandal.

Company C imposes age- and tenure-based diversification constraints on its employees as described previously. Therefore we examine employer stock holdings in only those accounts over which the employees have full discretion, employing the same identification method as for company G. Figure 15 plots the discretionary holdings in employer stock against initial

Figure 15. Shares of New Employee 401(k) Contributions Allocated to Employer Stock at Company C, by Initial Participation Date and Location, January 1998 to January 2003[a]

Percent

Source: Authors' calculations using data from Hewitt Associates.
a. Allocations are measured at the end of the year in which the participant enrolled.

enrollment date. As in figure 14, the allocation is measured at the first year-end snapshot after enrollment. As with company G, there is no significant reduction in the employer stock holdings of Texan employees relative to non-Texans. There are not enough Houston-based employees at company C to analyze them separately.

The evidence presented here does not seem to support the hypothesis that proximity to financial disaster leads to wiser decisions about employer stock.

Conclusions

Our analysis suggests that empowering employees to trade out of employer stock and educating them about the risks of employer stock will have only a small effect on 401(k) employer stock holdings. Even after diversification restrictions were relaxed at five companies, it was typical for over 90 percent of employer match balances to remain in employer stock. Two years of headlines about decimated 401(k) accounts in the early part of

this decade did little to drive investors out of their employer's stock. Our estimates suggest that the media publicity surrounding the Enron, World-Com, and Global Crossing bankruptcies reduced the fraction of aggregate 401(k) assets held in employer stock by at most 2 percentage points, from about 36 percent to about 34 percent. These results support the conclusions of earlier studies that consumers are often passive,[44] and that educational interventions yield remarkably small changes in saving behavior.[45]

These conclusions pose a problem for policy, because education and empowerment are the key components of almost all of the proposals for 401(k) employer stock reform listed in appendix table A-1 (for example, bills S.9, S. 1992, S. 2032, and S. 2190). None of these legislative proposals are nearly as stringent as those currently applied to defined-benefit plans, which cap employer stock holdings at 10 percent of account balances.

The persistent appeal of employer stock leaves economists in a policy-making quandary. On the one hand, the well-known benefits of diversification argue that employer stock should not make up a large fraction of a worker's retirement portfolio. On the other hand, economists dislike paternalism and do not want to enact coercive policies such as banning employer stock in retirement accounts. More generally, household saving decisions are fraught with other economically significant mistakes, which only the most paternalistic would consider forbidding.[46]

Fortunately, some reasonable policy options *are* available that are likely to reduce employer stock holdings without denying investors freedom of choice.[47] Under today's status quo, many firms invest matching contributions in employer stock. The natural experiments reported in this paper show that such matching contributions tend to stick where they initially land, regardless of any subsequent diversification opportunities. Hence employer stock holdings would be significantly reduced if the default asset allocation for employer matching contributions were changed to provide greater diversification. For example, default portfolios could be required to meet the same fiduciary standards that apply to defined-benefit pension plans.

44. Madrian and Shea (2001); Choi and others (2002).
45. Duflo and Saez (2003); Choi and others (2002); Choi, Laibson, and Madrian (2005a).
46. See Choi, Laibson, and Madrian (2005a).
47. See Sunstein and Thaler (forthcoming) for a general discussion of noncoercive prescriptive policies, which they call "libertarian paternalism."

With diversified defaults, investor inertia would be rendered harmless, because only those investors who actively opt out of the default could pile into employer stock. As noted above, in 401(k) plans that offer employer stock as an investment option but lack an employer stock *default* for matching funds, only 22 percent of balances end up in employer stock. By contrast, in 401(k) plans *with* an employer stock default for matching funds, well over 50 percent of balances end up in employer stock.[48]

Strict libertarians may object even to restrictions on default portfolios. If requiring diversified defaults is deemed too paternalistic, employees could be asked to explicitly choose their own asset allocation instead of being defaulted into an undiversified allocation.[49] Alternatively, legislation could remove the perverse tax benefits that give firms an incentive to choose employer stock as a default asset allocation.[50]

The common theme is that defaults stick and bad defaults are not inevitable. Bad defaults could be replaced with either good (diversified) defaults or with default-free choice. Banning bad defaults does not coerce employees, since they are free to opt out of a good default and adopt any asset allocation they choose. However, banning bad defaults does coerce firms, since they are no longer free to use defaults to induce their employees to become shareholders. Although we see this as a good thing for employees, there are some potential countervailing effects, such as a potential decline in the willingness of firms to provide a 401(k) match, or, in the extreme, to offer a savings plan at all.

Requiring (or at least encouraging) good defaults is a plausible solution to many weaknesses in the nation's retirement savings system. Defaults can be used to encourage participation in retirement plans, raise retirement saving rates among at-risk groups, and diversify 401(k) portfolios. In every case, defaults need not be coercive to work. However, defaults are a two-edged sword, since poorly chosen defaults can wreak havoc on financially unsophisticated, inertia-bound consumers.

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48. Although employees in these plans are required to hold a significant fraction of this employer stock, the evidence in this paper and in others shows that these requirements are not binding at the margin for most employees, since voluntary employer stockholding is so high in these plans.

49. Choi and others (2005).

50. However, some perverse incentives would not be easy to remove. For example, stock held by employees is often viewed as a protection against hostile takeover (Rauh, forthcoming).

Table A-1. Congressional Proposals to Regulate Employer Stock in 401(k) Plans, 2000–05

Bill no.	Title, sponsor, and date introduced	Provisions relating to employer stock in 401(k) plans	Status as of August 19, 2005
		Bills under consideration in the 109th Congress (2005–06)	
H.R.1960	Pension Preservation and Savings Expansion Act of 2005 Rep. Rob Portman (R–OH) April 28, 2005	Employees may sell employer stock derived from their own contributions immediately. Employees may sell employer stock derived from employer contributions after three years of service or three years after receiving the employer contribution. Plans that offer employer stock must offer at least three other investment options.	In House subcommittee
H.R.1961	Pension Preservation and Savings Expansion Act of 2005 Rep. Ben Cardin (D–MD) April 28, 2005	Employees may sell employer stock derived from their own contributions immediately. Employees may sell employer stock derived from employer contributions after three years of service or three years after receiving the employer contribution. Plans that offer employer stock must offer at least three other investment options.	In House subcommittee
S.219	National Employee Savings and Trust Equity Guarantee Act of 2005 Sen. Charles Grassley (R–IA) January 31, 2005	Employees may sell employer stock derived from their own contributions immediately. Employees may sell employer stock derived from employer contributions after three years of service. Plans that offer employer stock must offer at least three other investment options.	In Senate committee
		Bills under consideration in the 108th Congress (2003–04)	
H.R.1000	Pension Security Act Rep. John Boehner (R–OH) February 27, 2003	Employees may sell employer stock three years after receiving it. Companies may not require employees to invest their own contributions in employer stock.	Passed in House; no vote taken in Senate
H.R.1776	Pension Preservation and Savings Expansion Act of 2003 Rep. Rob Portman (R–OH) April 11, 2003	Employees may sell employer stock derived from their own contributions immediately. Employees may sell employer stock derived from matching contributions after three years of service, and employer stock derived from all employer contributions after five years of service. Plans that offer employer stock must offer at least three other investment options.	No vote taken

(continued)

Table A-1. Congressional Proposals to Regulate Employer Stock in 401(k) Plans, 2000–05 (*continued*)

Bill no.	Title, sponsor, and date introduced	Provisions relating to employer stock in 401(k) plans	Status as of August 19, 2005
H.R.2101	Pension Fairness Act of 2003 Rep. George Miller (D-CA) May 14, 2003	Employers must notify participants and inform them of the risks of not diversifying assets if employer stock exceeds 10 percent of balances. Participants must be informed of large employer stock sales by a corporate insider or plan fiduciary. Employees may sell employer stock after three years of service.	No vote taken
H.R.5397	Retirement Enhancement Act of 2004 Rep. Robert Andrews (D-NJ) November 19, 2004	Companies may not require participants to invest their own contributions in employer stock. Employees may sell employer stock derived from employer contributions after three years of service. Plans that offer employer stock must offer at least three other investment options.	No vote taken
H.R.5398	Retirement Enhancement Revenue Act of 2004 Rep. Robert Andrews (D-NJ) November 19, 2004	Employees may sell employer stock derived from employer contributions after three years of service. Plans that offer employer stock must offer at least three other investment options.	No vote taken
S.9	Pension Protection and Expansion Act Sen. Tom Daschle (D-SD) January 7, 2003	Employers must notify participants if employer stock exceeds 20 percent of 401(k) balances. Companies must certify that employer stock is a prudent investment. Firms may match in employer stock or offer it for employee contributions, but not both.	No vote taken
S.1892	Sen. Evan Bayh (D-IN) November 19, 2003	Plan administrators must notify participants that they may be overinvested in employer securities and real property if such assets' value exceeds 50 percent of 401(k) balances.	No vote taken
S.2424	National Employee Savings and Trust Equity Guarantee Act Sen. Charles Grassley (R-IA) May 14, 2004	Employees may sell employer stock three years after receiving it. Plans that offer employer stock must offer three other investment options.	No vote taken

Bills under consideration in the 107th Congress (2001–02)

H.R.3640	Pension Protection and Diversification Act of 2002 Rep. William Pascrell (D-NJ) January 29, 2002	Employer stock is capped at 20 percent of 401(k) assets. Employees may sell employer stock ninety days after receiving it. In ESOPs, employees may sell employer stock after five years of participation or at age thirty-five.	No vote taken
H.R.3692	Pension Protection and Diversification Act of 2002 Rep. Sheila Jackson-Lee (D-TX) February 7, 2002	Employer stock is capped at 20 percent of 401(k) assets. Employees may sell employer stock ninety days after receiving it. In ESOPs, employees may sell employer stock after five years of participation or at age thirty-five.	No vote taken
H.R.3762	Pension Security Act of 2002 Rep. John Boehner (R-OH) April 15, 2002	Companies may not require participants to invest their own contributions in employer stock. Employees may sell employer stock after three years in the plan. Plans that offer employer stock must offer at least three other investment options.	Passed in House; no vote taken in Senate
H.R.5110	Omnibus Corporate Reform and Restoration Act of 2002 Rep. Sheila Jackson-Lee (D-TX) July 12, 2002	Employer stock is capped at 20 percent of 401(k) assets. In ESOPs, employees may sell employer stock after five years of participation or at age thirty-five.	No vote taken
S.1838	Pension Protection and Diversification Act Sen. Barbara Boxer (D-CA) December 18, 2001	Employer stock is capped at 20 percent of 401(k) assets. Employees may sell employer matching contributions made in employer stock ninety days after receiving it.	No vote taken
S.1919	Retirement Security Protection Act of 2002 Sen. Paul Wellstone (D-MN) February 7, 2002	Employer stock is capped at 20 percent of 401(k) assets. Companies may not require participants to invest their own contributions in employer stock. Employees may sell employer contributions made in employer stock after one year of service.	No vote taken

(continued)

Table A-1. Congressional Proposals to Regulate Employer Stock in 401(k) Plans, 2000–05 (*continued*)

Bill no.	Title, sponsor, and date introduced	Provisions relating to employer stock in 401(k) plans	Status as of August 19, 2005
S.1971	National Employee Savings and Trust Equity Guarantee Act (NESTEG) Sen. Charles Grassley (R-IA) February 27, 2002	Employees may sell employer stock three years after receiving it. Plans that offer employer stock must offer at least three other investment options.	No vote taken
S.1992	Protecting America's Pensions Act of 2002 Sen. Edward Kennedy (D-MA) March 6, 2002	Employees may sell employer stock three years after receiving it. Companies may not require participants to invest their own contributions in employer stock. Plans must provide information regarding diversification rights and the importance of diversifying assets. Plans that offer employer stock must offer at least three other investment options.	No vote taken
S.2032	Investor-Employees Need Financial Facts and Options for Responsible Retirement Plan Management Act of 2002 (INFORM) Sen. Richard Durbin (D-IL) March 19, 2002	Employers are liable for excessive losses on employer securities during lockdowns on plan assets. Employers must notify participants if employer stock exceeds 30 percent of balances, and further employer contributions to employer stock are prohibited until the participant signs a form acknowledging the risks of not diversifying assets.	No vote taken
S.2190	Worker Investment and Retirement Education Act of 2002 (WIRE) Sen. John Kerry (D-MA) April 17, 2002	Plans must provide investment guidelines to participants. Companies may not require participants to invest their own contributions in employer stock. Plans that offer employer stock must offer at least three other investment options. Employees may begin selling employer contributions of employer securities after five years in the plan, with full divestment permitted after seven years. Employees may begin selling employer matching contributions of employer securities after three years in the plan, with full divestment permitted after five years.	No vote taken

Source: Library of Congress, THOMAS data and authors' analysis.

Comments and Discussion

William G. Gale: This paper by James Choi, David Laibson, and Brigitte Madrian documents the well-known fact that many workers invest a significant share of their 401(k) contributions in the equity of their own employer, and briefly reviews the literature indicating that that share is too large. The basic argument here is correct. Asset returns on a well-diversified equity and bond portfolio will have a smaller variance than those on a concentrated equity portfolio. And, of course, holding employer stock increases the correlation between a worker's labor market and financial market outcomes, which is not likely to be a good thing.

The paper also documents that workers do not diversify away from employer stock when given the chance to, and even when bombarded with news stories illustrating the problems of holding employer stock. The evidence is compelling. Although the authors spend a lot of effort "proving" this result with a variety of regressions, readers should not come away thinking that the result is somehow sensitive to the specification. Figure 6 in the paper shows the stability of employer stock holdings over the relevant sample period. Although some variation is evident, the authors point out that the more relevant of the two series, employer stock as a share of equities in 401(k)s, varies relatively little. Moreover, the variation is especially small given that the optimal level for this series should be very close to zero.

Having bought into the basic findings, I will turn to two related points that may provide some perspective on the issues the authors address.[1] The first is that the current set of rules governing how workers may invest their 401(k) balances is essentially an accident of history. The 401(k) has come

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1. Much of the rest of this comment is based on Gale and Iwry (2005).

to play a far more central and critical role in the pension system than was envisioned when it was created in the late 1970s, yet the rules have changed little since then.

Twenty-five years ago, defined-benefit plans (together with certain types of traditional defined-contribution pension plans, such as employer-funded profit-sharing plans and money purchase plans) were workers' primary source of private pension coverage. These plans require workers to make almost no important financial choices before retirement. The firm enrolls all eligible workers, makes contributions on their behalf, and makes all the investment decisions or retains professional investment managers to do so. The worker's only real choices are when and in what form to collect benefits.

When 401(k) plans began their rapid spread in the early 1980s, they were viewed mainly as supplements to these traditional employer-funded plans. Since 401(k) participants were presumed to have their basic retirement income security needs covered by a traditional employer-funded plan and Social Security, they were given substantial discretion over their 401(k) choices, including whether to participate, how much to contribute, how to invest, and when and in what form to withdraw the funds.

Over the past twenty-five years, however, the pension landscape has changed dramatically. Many workers covered by an employer plan now have a 401(k) as their primary or only plan. Yet 401(k)s still operate in much the same way as in the early 1980s. Workers must still, for the most part, decide for themselves whether and how much to contribute, how to invest, and how and when to withdraw the funds. Imposing on workers the responsibility to make these choices may have been relatively harmless when 401(k)s were smaller, supplemental plans with limited coverage. The risk of workers making poor investment choices looms much larger now that 401(k)s have become the primary pension vehicle.

The second point is that government policies have encouraged this situation in several ways. As 401(k)s have expanded over the last twenty-five years, Congress has been enacting rules that implicitly or explicitly encourage overinvestment in company stock. First, the Employee Retirement Income Security Act of 1974 (ERISA) relieved employers of most fiduciary responsibility for investment losses if they allowed employees to direct their own investments—this was likely one factor encouraging the shift to 401(k)s. Second, the main exception to the pervasive use of employee-directed investment in 401(k)s has been plan sponsors' frequent decision to make

their contributions to these accounts in the form of employer stock. Although this tendency undermines diversification and might normally be considered a conflict of interest, Congress actually granted special exceptions from the normal fiduciary standards to allow employer (and employee) contributions to be heavily invested in employer stock. Third, there are tax subsidies that favor employee holding of employer stock.

Meanwhile the rationales originally articulated for providing special exceptions for employer stock are very weak. One rationale was to encourage worker ownership of equities, but this has already been addressed by the availability of diversified equity investments through 401(k)s. A second rationale was to encourage higher productivity through increased worker ownership. The introduction of 401(k)s probably has not had much of a productivity effect, however. A third rationale was that the ability to donate employer stock encourages firms both to offer 401(k) plans and to offer matching contributions. (This becomes an issue particularly during hard times and for privately held companies.) This concern may well be overstated, especially if the tax subsidies are removed, but even if it is not overstated, it can probably be dealt with through other policy options.

Although the authors discuss policy options, let me mention some distinctions that I think are crucial. For example, no one is considering banning workers from holding employer stock outside of their 401(k) or banning firms from offering employer stock as a form of compensation. The issue is how much, if any, employer stock holding should occur within 401(k) plans. Because 401(k)s are subsidized, this is a legitimate question, especially since other prohibitions exist for 401(k) investments. In addition, policy for employer stock holding in 401(k)s ought to distinguish between firms that also offer a defined-benefit plan and firms that do not, and between firms issuing stock to 401(k) participants as part of the company match and employees using their 401(k) balances to buy employer stock on their own. In fact, most employee holdings of employer stock in 401(k)s are there by the employees' choice, not from employer contributions. Lastly, at the very least policy rules should be neutral toward employer stock holding rather than actually encourage it.

Given these considerations, a number of promising options exist. Congress could give a fiduciary safe harbor to plan fiduciaries that follow a systematic employer stock divestiture program. This would facilitate divestiture by plan sponsors that recognize they might have gotten in too deep but are still hesitant to divest themselves of the company stock. Employers

fear litigation for fiduciary breach if their plans sell company stock or sell it too quickly (in the event the stock's value subsequently rises) or too slowly (in the event it falls). A safe harbor "glide path" for systematic, gradual diversification would also help address employers' other legitimate concerns: that large sales of company stock from the plan might depress the market for the stock or, more commonly, that the market or employees might perceive such sales as a signal that management lacks confidence in the company's future.

An alternative is the "Sell More Tomorrow" plan proposed by Richard Thaler and Shlomo Benartzi.[2] They suggest that plan sponsors offer employees the option of participating in a systematic program of gradual employer stock divestiture over a period of years. Consistent with the employer-level safe harbor "glide path" approach suggested just above, Thaler and Benartzi advocate this creative, employee-level approach as a way to encourage employees to take a possibly difficult step by arranging to do most of it in the future. By spreading out the sale of the shares over time, this approach also avoids potentially depressing the market for the stock and mitigates any risk of employee remorse for having sold at the wrong time.

Another possible approach would be to permit employees to invest their own contributions in employer stock only to the extent their total contributions in a given year exceed some threshold. Such a threshold could be set, for example, at 7 percent of pay—a level slightly above the actual average 401(k) contribution rate—or it could be based on whether the firm also has a defined-benefit plan. Any of these options would be preferable to the current set of rules.

Nellie Liang:[1] This paper by Choi, Laibson, and Madrian empirically examines two very important issues, empowerment and education, in the context of how employees manage their company stock holdings in their 401(k) accounts; it also presents some policy recommendations. The authors first take a close look at empowerment by documenting how employees react when diversification constraints on such holdings are relaxed. They consider data from each of several companies (each with its own variant on these constraints), sketch out the maximum diversification

2. Benartzi and Thaler (2002).

1. The opinions expressed here are mine and not necessarily those of the Federal Reserve Board.

allowed, and compare that with what an average or typical participant does. They find that participants diversify to only a very modest degree and retain what appears to be too much company stock from the perspective of a mean-variance efficient portfolio. The authors use this evidence to argue that legislation that simply relaxes diversification constraints will do little to help the current situation.

The authors' evidence on the effect of education comes from looking at net transfers of company stock and whether it responds to news about other companies whose employees suffered from holding too much or even any company stock. The authors create indexes of the quantity of news about Enron, Global Crossing, and WorldCom and use these as independent variables in regressions explaining net transfers of company stock, first for a constant sample of companies in the Hewitt index, and then for two companies for which they have individual participant data. They find only modest effects of the news index on net transfers, and they interpret this as evidence that financial education is ineffective. They argue that employees would be better off if policies were established to encourage firms to set "proper" (more diversified) defaults.

To sum up, the authors start from the premise that firms understand how employees behave and that they exploit that behavior to promote company stock; the authors then argue that employees do not understand basic diversification principles and that there is no hope that they will learn. Although I am sympathetic to many of the authors' conclusions, my comments will elaborate on how the cost of company stock should be evaluated and will question whether the authors' news index is a true measure of education. In the end, however, my policy recommendations will not differ all that much from theirs.

My first set of comments relates to the empowerment evidence and whether employees' behavior is as irrational as it seems. To understand asset holdings, one needs to recognize that the very large share of assets held in company stock can be explained largely by the employer match policy and that employees rarely make changes to these holdings once contributions are invested. This part of the discussion draws on a recent paper that I co-wrote that discusses the costs and benefits to firms of providing the employer matching contribution in company stock.[2] Analyzing roughly 3,200 firm-year observations, our paper finds that if the employer match is

2. Brown, Liang, and Weisbenner (forthcoming).

not made in company stock, employees will voluntarily invest on average about 16 percent of their own contributions in company stock. A share of that size is not by itself likely to warrant legislation to encourage greater diversification. However, if the employer match is in company stock, employees will invest even more, about 25 percent on average, of their own contributions into company stock; this additional 9 percentage points has been attributed to employees viewing the employer match in company stock as an implicit endorsement of company stock as an investment.[3] This higher share combined with the employer match leads to a very high 46 percent of total contributions being invested in company stock each year at firms that match in company stock, a share that would seem to violate all notions of what constitutes an efficient diversification strategy. Moreover, asset holdings of company stock, at 42 percent of the total, are a strong indication that contributions once made tend to stick in the asset category in which they are initially invested.

Why do firms like to have employees hold company stock in their 401(k) plans? One reason is that company stock is less expensive to offer than other options, because there are no fees to pay to an asset manager or even to an index fund. In addition, company stock promotes employee ownership, which may raise employee morale and productivity. The cross-sectional empirical evidence suggests that firms also may like company stock because it can reduce their tax bill if they pay dividends. More important, by putting company stock in "friendly hands," employee holdings of company stock can operate as an antitakeover mechanism.[4] Interestingly, we found no evidence that, among firms that offer an employer match, lack of earnings or cash flow increased the likelihood that a match would be made in company stock. In fact, we found almost an opposite result: firms with lower bankruptcy risk and lower stock price volatility were *more* likely to match with company stock. Thus it is not the case that the riskiest firms are pushing their stock onto their employees.

For their part, employees might like to hold company stock for a number of reasons, some of which might not be considered rational from an efficient mean-variance portfolio perspective. The hypothesis that employees hold company stock out of loyalty to their company has found some empirical

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3. Benartzi (2001); Liang and Weisbenner (2002).
4. See also Rauh (forthcoming).

support,[5] and a perception that company stock is less risky than other individual stocks is supported by survey responses. But we know that the latter view cannot be right, and in our paper we confirm, using simulations based on historical asset returns, that it is costly for employees to have a large share of their 401(k) assets in company stock rather than in a diversified equity fund: placing the employers' matching contribution in a diversified equity fund rather than company stock results in greater wealth upon retirement 81 percent of the time. Most risk-averse employees would therefore surely prefer the portfolio with the match in diversified equities.

However, as noted, firms do have some incentives to match with company stock, whereas they have no incentive, and maybe some risk arising from ERISA, to match with diversified equities. So the more relevant comparison to evaluate is whether retirement wealth is greater when the employer match is made in company stock, or when the match is unrestricted and employees are given discretion over how to invest the match dollars. Simulation results for these two scenarios suggest that many employees would prefer the 401(k) portfolio at a firm that matches with company stock over an otherwise equivalent portfolio at a firm with an unrestricted match. Why would this result arise? An important reason is that employees left to make their own choices might not invest efficiently, but instead might put the entire match into a single other asset or invest using a $1/n$ diversification rule, as has been found in a number of studies.[6] In our simulations, a $1/n$ rule would lead to about half the contributions being invested in fixed-income securities and half in equities (including company stock). In this comparison many employees would have been better off with the company stock match portfolio, because the greater proportion of equities from the company stock match would generate more expected wealth, although also more risk, given the historical equity premium. Another reason is that, as already noted, firms that match in company stock have less volatile stock prices and are less likely to go bankrupt than firms with an unrestricted match. As noted above, however, many employees would still be better off with a diversified equity fund.

5. Cohen (2005).
6. Benartzi and Thaler (2001); Liang and Weisbenner (2002); Huberman and Jiang (2004). Huberman and Jiang find that, among participants who invested in five or fewer options, $1/n$ (that is, an equal division of assets across all available types of asset) approximated behavior for a large fraction.

What this comparison illustrates is that policies designed to restrict employer matches in company stock will be more of a constraint for less risky firms, which would reduce the potential benefits of the restriction. More important, it illustrates that very careful consideration should be given to how employees might invest the employer match if matching in company stock were restricted.

Finally, one benefit of holding company stock in a 401(k) plan has not received a lot of attention but seems potentially important. According to the net unrealized appreciation rule that applies to company stock in 401(k) plans, the gains on company stock can be taxed at the capital gains rate, whereas gains on other assets (such as a diversified equity fund) are taxed at the higher, ordinary income tax rate. When this rule applies, only the cost basis of the company stock match would be taxed at the income tax rate. Although there are restrictions on when this favorable treatment would apply, this benefit can be considerable for employees in high income tax brackets who have company stock that has appreciated considerably.

If the authors' dataset includes participant characteristics that could proxy for their tax status, it would be interesting to look at whether this tax benefit is an important explanation for why employees do not diversify out of company stock as they approach retirement. One could then test whether employees close to retirement age are more likely to hold large amounts of company stock if they are in a high tax bracket and have enjoyed a substantial stock price appreciation.

What are the effects of financial education on employees' investment decisions? Currently, there is not much clear evidence indicating that such education leads to better financial choices. Many empirical studies that do find such an effect seem subject to the criticism that those participants willing to invest in financial education may well be those most willing to make portfolio changes in the first place, lending an upward bias to any measured effects. But the test in this paper is hard to interpret. The news index the authors construct may not really be a measure of education about company stock or about the benefits of diversification, and in any case their specification may not permit any effects of such education to show through.

The authors' index quantifies the number of news articles related to three companies that failed spectacularly because of massive fraud. The idea is that such news could educate employees of other companies by showing them real-world examples of how holding too much 401(k) wealth in company stock can lead to substantial losses. However, it is likely that

employees already understand that their own firm could conceivably fail and that the value of their company stock could fall to zero. More important, it is not clear whether more information about these three companies, which may not be perceived as typical, would change employees' views about the risk of owning stock in their own employer. Therefore it is not clear whether one should interpret this variable as financial education and expect to observe an effect.

In fact, one might be comforted by the result that news about these outliers does *not* lead investors to change their views about the distribution of their own possible wealth outcomes. To illustrate, suppose that the authors had instead created a news index of three companies with dramatic stock price gains, such as Yahoo, Amazon, and eBay, and found that news of wealth creation at these three companies led employees at other companies to purchase more of their own company stock for their 401(k)s. I do not think most economists would be sanguine about such results. Instead, one could interpret the small effect that the authors find as evidence that employees realize that these firms *were* outliers and that these incidents did not convey to them new information about the risk of their own company.

It is also possible that the lack of strong evidence between net transfers and this news measure reflects a measurement problem. In particular, given the lack of attention and energy that employees apply to managing their accounts, it does not seem reasonable to look at net transfers at a daily frequency; it might also be the case that the news does not generate an immediate effect, but rather that the effect builds over time (instead of decaying as the authors assume). Hewitt Associates reports that only one in six accounts had any kind of transfer in 2002, and the same in 2003. If employees are slow to implement their portfolio changes, if any, daily intervals for examining transfers might be too short.

Finally, if the data are available, a valuable addition to the paper would be an exploration of why, according to Hewitt Associates, the share of aggregate 401(k) assets in company stock has fallen. It does not appear that net transfers can explain the 10-percentage-point decline in the share of assets in company stock from the end of 2001 to mid-2003. Perhaps employees responded to the news about Enron, WorldCom, and Global Crossing by redirecting *new* contributions away from company stock rather than by transferring assets. Or perhaps employers responded to employees' demands to change the employer match from company stock to an unrestricted match. The latter alternative strikes me as a very likely explanation.

Let me conclude by discussing some of the policy implications of the authors' findings. First, I would agree that serious consideration should be given to limiting the employer match in company stock. Such matching is a primary reason why so much company stock is held in 401(k) portfolios. But consideration should be given to the fact that it is the less risky firms that are more likely to match in company stock, and that it is not always the case that what participants would do on their own will yield a better outcome. It is not difficult to demonstrate that there are inferior alternatives to an employer match provided in company stock. Policies should be designed to reduce a firm's potential liability associated with advising employees about how to invest the employer match. Second, I would not interpret these findings as showing the futility of financial education. I do not know whether the authors' index is really a measure of education, or if their choice of time intervals for their estimations biases against finding a result. Moreover, I do not think the appropriate message is to give up on education. Instead, more emphasis should be placed on finding ways to make it work better. Finally, an easy prescription is to eliminate certain tax preferences, especially the one that permits individuals to pay the lower capital gains rate on the appreciation of company stock but not on that of other equities. This preference seems especially costly because it promotes the retention of large company stock holdings right before retirement.

General discussion: Gregory Mankiw said he was uncomfortable with the general approach to policy analysis embodied in the literature to which this paper contributed. In Mankiw's view this approach consisted of observing behavior that appears inconsistent with economists' models of rational decisionmaking and then recommending policy changes to encourage agents to behave more like the models. It implicitly assumes that economists are smarter or know more than the agents making the decisions. What this literature does not adequately address is why firms and employees behave the way they do. Although the paper mentions several possible reasons—the special tax treatment of gains on company stock, the use of 401(k) plans as an antitakeover mechanism, employee loyalty to the firm—until economists understand why some companies encourage or require their employees to hold company stock, it is hard to conclude that a remedy is needed.

Alan Blinder took the opposite view, suggesting that the discussion had given insufficient respect to paternalism. No one with even the slightest knowledge of finance would recommend putting a large fraction of one's

wealth in employer stock. Blinder cited Nellie Liang's finding that people believe it is less risky to invest in their own company's stock than in an S&P 500 index fund. This shows that people do not understand the importance of the high correlation between returns on their most valuable asset—their human capital—and returns on their own company's stock. He cited the success of the flypaper theory of portfolio allocation—that money tends to stick wherever it lands—as further evidence of irrational investor behavior. Blinder argued that picking a sensible default portfolio allocation would almost certainly improve the risk-adjusted investment returns of those employees who tend to stick with what they are initially given, yet would not constrain the options of employees who believe they have a good reason for choosing some other allocation.

Francesco Giavazzi noted that the paper's results were in line with those of a recent experiment in Italy: Italian companies are required to contribute between 8 and 10 percent of each employee's take-home pay to an employee retirement account, from which the worker can withdraw only upon leaving the company. Until recently these accounts were, in effect, a corporate bond that pays a below-market interest rate but, in the case of bankruptcy, were senior to any other company liability. Because job turnover in Italy is low, the accumulated sum amounts, on average, to two years of wages upon termination of employment. A couple of years ago, however, the government lifted the restriction on how contributions could be invested, yet a negligible proportion of employees chose to reallocate their portfolios. Of course, this behavior could also be interpreted as evidence of extreme risk aversion, with workers being attracted by the seniority of their claim on the company in the traditional arrangement.

Robert Gordon drew parallels between the collapse of Enron and the other companies studied and the airline industry after the September 11 attacks. United Airlines, for example, had established an employee stock option plan (ESOP) in 1994, when employees accepted substantial wage cuts in return for company stock, without the option of diversification. This otherwise admirably conceived plan failed after September 11, and the employees lost everything. Gordon also noted that the pension strategies followed by the successful younger airlines, particularly Southwest and JetBlue, are, if anything, likely to have increased the vulnerability of their employees to company failure. The older airlines had created defined-benefit pension plans subject to ERISA, whereas the newer airlines provide pension benefits through profit-sharing plans, through which they give their own company

stock to employees, much as in an ESOP. Although nothing prevents these employees from reallocating their portfolios, the results presented by the authors suggest that they, too, are likely to be heavily invested in the risky stock of their own companies.

Hyun Shin observed that the fraction of employer stock in total 401(k) balances is the mirror image of the fraction of those same stocks in major stock indexes over the period. This suggests that a substantial portion of company stocks held in 401(k)s are low-risk stocks like GE. William Brainard found the figures in the paper persuasive and consistent with his priors that the failures of Enron and the like would have had little effect on employees' investment decisions. But he also thought the failure of news about these events to explain daily data on employee stock transfers would not be surprising even if employees' behavior had been affected. Most employees appear to make decisions about portfolio allocations infrequently: Liang had reported that only one in six accounts had any transfer activity at all in 2002. If individuals did change their allocations in response to news, it would be hard to see in daily data and would likely reflect views acquired over a much longer period than that captured by the authors' short-run news measure.

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