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Corporate Pension Funding Status and the Market for Corporate Control: The Disciplinary Role of Pension Deficits in Mergers and Acquisitions

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Abstract

This paper examines the disciplinary role of corporate pension deficits in the market for corporate control. We find that during the 1988-2008 period, firms with larger pension deficits are less likely to engage in mergers and acquisitions (M&As) than those with smaller or no pension deficits. Among a subsample of firms that engage in M&As, those with larger pension deficits spend less on their M&A activities and are less likely to make diversifying acquisitions. We also find that bidder returns and value-weighted portfolio returns of the bidders and the targets around M&A announcements increase with bidders' pension deficits. Furthermore, the extent of acquirers' pension deficits is, respectively, negatively and positively related to the premiums paid to the targets and the percentage of cash used in target payment. These findings suggest that corporate pension deficits provide employees with strong incentives to monitor managerial performance and influence managers to make value-enhancing investment decisions.

“Employee engagement levels are linked to perceptions of a company’s leadership and, more specifically, the extent to which members of the workforce believe senior management is committed to their well-being. Leading organizations understand that retirement programs and, more specifically, benefit security, can play a role in favorably influencing employee perceptions of senior management and the overall organization.”

Towers Perrin (2009) “CFO guidebook: pensions and corporate financial performance - intricately linked”

The extent of debt in a firm’s capital structure can influence managerial decisions in a significant way. For example, Jensen (1986) argues that managers with large free cash flow have incentives to over-invest beyond the optimal level and high debt serves as the controlling mechanism that prevents managers from wasting free cash. Consistent with this argument, Maloney, McCormick, and Mitchell (1993) and Kang (1993) show that bidder announcement returns are positively related to the bidder’s leverage. In a similar vein, Ofek (1993) documents that high leverage increases the likelihood of asset restructuring and employee layoffs for firms experiencing performance decline. Berger, Ofek, and Yermack (1997) show that firms with entrenched managers tend to maintain lower leverage and Hanka (1998) finds that higher debt is associated with more frequent employment reductions and lower wages. Banking literature further shows that the disciplinary role of debt is more evident for bank loans than for public debt (Campbell and Kracaw (1980), Diamond (1984), Fama (1985)). As an inside debtholder, banks obtain a competitive advantage over other capital market participants in collecting information about the borrowing firms (Fama (1985), Rajan (1992)), and can thus intervene quickly and informally.

Although these studies enhance our understanding of the disciplinary role of debt, bank debt in particular, in corporate decisions, one important form of debt that has not received much attention in the literature is a firm’s borrowings from its employees. In this paper, using a large sample of mergers and acquisitions (M&As) during the 1988-2008 period, we explore how corporate pension deficits, a type of “inside” debt, influence managerial incentives in investment decisions. We focus on the role of employees as informed large debtholders and examine whether borrowings from employees (i.e., pension deficits) can have an important impact on takeover decisions. While the workforce represents one of the most important claimholders, we know relatively little about its role in a firm’s investment decisions as

the controlling mechanism. This lack of evidence is surprising, given the fact that the combined pension deficit for S&P 500 companies reached \$376 billion at the end of 2008 (*The Wall Street Journal*, February 12, 2009) and pension liabilities on average account for 15% of total assets and nearly one half of the long-term debt during our sample period.¹

There are several reasons why pension deficits are expected to serve as the important mechanism that controls the discretionary power held by managers and monitors managerial decisions. First, as described above, pension deficits account for a significant portion of total debt. Furthermore, firms with large pension deficits are required by laws to make periodic contributions. These two aspects of pension deficits reduce the agency cost of free cash flow by limiting the cash flow available for spending at the discretion of managers. Second, pension obligations can serve as a stronger bonding mechanism than other types of debt obligations since in addition to numerous pension laws that are in place to govern pension underfunding, the Pension Benefit Guaranty Corporation (PBGC) requires firms to pay a higher variable insurance premium for their larger pension underfunding. These legal requirements further reduce the free cash flow available to managers. Third, as an insider, employees are likely to possess material private information. This allows the employees to have a competitive advantage in collecting information and monitoring managers. Fourth, as shown by Ippolito (1997), pension funding status affects employees' perceived firm risk. For example, large pension deficits may weaken the incentives of employees to work hard. Also, firms with large pension deficits are likely to experience difficulties in retaining key employees and attracting talented potential employees. This high firm risk perceived by current and future employees can incentivize managers to be more efficient in their investment decisions, which suggests that managerial incentives to undertake risky negative net present value projects will be smaller if firms have larger pension deficits. Fifth, pension deficits as a claim held by employees on firm value are usually senior to other types of debt. This seniority reduces the monitoring costs of the lender by avoiding a claim priority contest (Welch (1997)) and allows the monitoring lenders to appropriate the

¹ Defined benefit pension plans were generally overfunded in aggregate before 2000. For example, in 2000, balance sheets of pension sponsors in Compustat show a surplus of around \$200 billion. However, due to a stock market downturn and a cut in interest rate in 2002, defined benefit pension plans became significantly underfunded by almost \$500 billion in that year. Although pension funding status displayed a slight rebound in 2006 and 2007, the 2008 sub-prime crisis no doubt worsens the situation.

full return from their monitoring activities (Park (2000)), making employee debt as the effective monitoring mechanism. Finally, previous studies show that large pension deficits result in a high cost of debt since rating agencies directly incorporate pension deficits into their evaluation on corporate debt (Cardinale (2007), Rauh (2007)). Thus, pension deficits, which attract attention of rating agencies that are known to play an important monitoring role as financial intermediaries (Boot, Milbourn, and Schmeits (2006)), can serve as an indirect surveillance on managerial misbehavior.

Using all firms in Compustat from 1988 to 2008, we find that firms with larger pension deficits are significantly less likely to engage M&As at the 1% level than those with smaller or no pension deficits. We also find that among a subsample of 18,452 firms that engage in M&As, those with larger pension deficits spend less on their M&A activities and are less likely to make diversifying acquisitions. The test of economic significance shows that a one-standard deviation increase in the ratio of pension deficits to total assets is associated with a 0.15% lower acquisition expenses and a 1.96% lower likelihood of making diversifying acquisitions.

Turning to the analysis of announcement returns, we find that the three-day bidder returns and the three-day value-weighted portfolio returns of the bidder and the targets increase significantly with bidders' pension deficits at the 1% level. Economically, a one-standard deviation increase in an acquirer's pension deficits over total assets translates into a 0.22% increase in bidder announcement returns and a 0.55% increase in combined portfolio returns. These results suggest that the disciplinary effect of pension deficits is both statistically and economically large and significant.

Finally, further supporting the view that pension deficits serve as the important disciplinary mechanism, we find that acquirers' pension deficits are negatively associated with the premiums paid to the targets but are positively related to the percentage of cash used in deal payment. Economically, a one standard-deviation increase in an acquirer's pension deficits over total assets results in a 2.81% decrease in takeover premium and a 2.86% increase in the fraction of cash payment. Taken together, these results suggest that pension deficits not only limit the managerial hubris to overpay (Roll (1986)) but also

influence managers to choose undervalued targets (Shleifer and Vishny (2003), Dong, Hirshleifer, Richardson, and Teoh (2006)).

To verify the robustness of the regression results above, we conduct several additional tests, such as (1) using Heckman selection models to deal with the sample selection bias, (2) controlling for corporate governance index and two measures of mandatory pension contributions developed by Campbell, Dhaliwal, and Schwartz (2009b) in the regressions,² (3) estimating the piecewise regressions by dividing the pension deficits into several ranges, and (4) estimating industry fixed-effect regressions to control for potential industry effects. Our results are robust to these endogeneity and model specification issues.

Our work is related to several recent studies that examine the impact of pension funding on corporate investments. For example, Rauh (2006a) examines the effects of required pension contributions on corporate investments and finds a negative and significant relation between them. This result suggests that firms underinvest as a result of pension contribution. In his another paper, Rauh (2007) investigates the effects of changes in a firm's financial condition on capital expenditures and shows that leverage ratio has a strong negative impact on a firm's capital investment even when the variation in leverage is strictly due to pension fund asset performance that is uncorrelated with the sponsor's investment opportunities. Bergstresser, Desai, and Rauh (2006) argue that managers adjust assumed pension rates of return in managing earnings and show that managers are more aggressive with adjusting these rates of return when they prepare to acquire other firms, when they are near critical earnings thresholds, and when they exercise stock options. Finally, Franzoni (2009) investigates the price reaction to the payment of mandatory pension contributions to a firm's defined benefit pension plan. He shows that the price decrease due to a pension-induced drop in cash is magnified for more financially constrained firms and interprets this result as the evidence for a negative effect of financing frictions on investment.

² These two measures include (1) aggregate pension expense divided by total assets if aggregate pension plans are underfunded and zero otherwise and (2) service cost plus $(ABO - PPA) / 30$, all divided by total assets if $ABO > PPA$ and zero otherwise, where ABO (accumulated benefit obligation) is the actuarial present value of all future pension benefits earned to date based on current salary levels, ignoring future salary increases, and PPA (pension plan assets) is the market value of the contributions made by a defined benefit sponsoring firm over the life of the plan. See Campbell, Dhaliwal, and Schwartz (2009b) for details of the construction of these two measures.

Although our paper also examines the effect of pension funding status on corporate investments, it is different from prior studies in at least two important ways. First, previous papers explore the effect of financing frictions on investment by examining how pension contributions affect capital expenditures. Unlike these papers, we focus on the disciplinary role of pension deficits by investigating how pension deficits influence managerial discretion in a firm's investment decisions. Second, to provide convincing evidence on the disciplinary role of pension deficits, we use takeover bids as our experiment. Unlike other routine capital expenditure decisions, takeover bids provide a natural experiment because they typically represent large and discrete investment choices. Furthermore, takeover decisions represent a setting where managers sometimes pursue private objectives during acquisitions at the expense of shareholder wealth (Jensen and Ruback (1983), Jarrell, Brickley, and Netter (1988)). Thus, acquisitions represent an instance where informed stakeholders such as large shareholders, creditors, and workers can have an important impact on managerial decisions.

Our paper is also related to a few recent papers that examine the role of the workforce in corporate governance. For example, Pagano and Volpin (2005) argue that if managers have high private benefits, managers and workers are more likely to stand against takeover threats. Managers offer long-term contracts to guard against raiders, and to protect their high wages, workers are willing to resist hostile takeovers by refusing to sell their shares to the raider. Supporting this view, Rauh (2006b) shows that employees' large stock holdings in their own companies form a takeover defense, by which entrenched managers are able to insulate themselves from market discipline. Similarly, Faleye, Mehrotra, and Morck (2006) investigate the role of labor in corporate governance and show that a labor voice in corporate governance is associated with significantly depressed shareholder value, sales growth, and job creation. Unlike these papers that show the negative role of workforce in corporate governance, our paper focuses on its positive role in influencing manager behaviors and affecting shareholder wealth.

By examining the effect of pension deficits on takeover decisions, we extend the existing literature in two important ways. First, our paper sheds light on the governance role of pension deficits as inside debt. Previous studies show that debt in general and bank debt in particular significantly affect various

corporate actions and shareholder wealth, but no study investigates how pension deficits affect bidder managerial behaviors and market reactions to M&A announcements. We extend these studies by showing that pension deficits influence managers to make value-enhancing investment decisions.

Second, our study enriches the literature on stakeholder theory of the firm by showing that employee incentives are able to exert influences on management behaviors in the market for corporate control. We show that interests of employees and those of shareholders are more closely aligned when workers' retirement claims are tied to managers' investment quality, thereby identifying a clear and important channel, through which pension plan funding status is related to the shareholder wealth. Our results hence complement the findings of Cronqvist, Heyman, Nilsson, Svaleryd, and Vlachos (2009), who show that entrenched CEOs are willing to pay more to employees to enjoy private benefits, such as improved social relations with employees.

The rest of the paper is organized as follows. Section I briefly reviews the institutional background of U.S. pension plans and develops the main hypotheses. In Section II, we describe the data and methodology we use to address the sample selection bias. Section III presents the empirical results on the effects of pension funding status on M&A activities, announcement returns, and takeover premiums. Section IV presents the results from robustness tests. Finally, we present summary and concluding remarks in Section V.

I. Institutional Background of Corporate Pension Plans and Main Hypotheses

A. Types of Pension Plans and Laws Related to Defined Benefit Pension Plans

There exist two basic types of retirement plans in the U.S.: a defined contribution plan (hereafter "DC plan") and a defined benefit plan (hereafter "DB plan"). The DC plan requires employees to make contributions and the employer promises to make periodic contributions to the retirement accounts of eligible employees. Employees covered by the DC plan bear all of the shortfall risk at retirement.

A firm sponsoring a DB plan, on the other hand, has an obligation to retirees and current employees, which amounts to the present value of the future payment estimated based on various actuarial

assumptions concerning mortality rates, discount rates, etc. To meet a stream of its future committed payments, the firm makes periodic contributions to a fund. Since the employee's future benefit is defined, the employer assumes the investment risk. From a legal point of view, the firm's contributions, along with the investment returns from these contributions, should be adequate to meet its future obligation. Moreover, the use of pension assets measured in a fair value is restricted to paying outstanding pension obligations only. The pension funding status of a DB plan is considered to be underfunded (fully funded or overfunded) if the fair value of pension assets is less than (equal to or more than) the present value of the pension liabilities. The pension plan sponsor is usually required by law to make contributions when the pension plan is underfunded but exempted from contributions if the pension plan is either fully funded or overfunded.

The minimum pension contribution depends on the funding status of the DB plan and is determined by funding rules established by the Internal Revenue Code and Employment Retirement Income Security Act (ERISA) of 1974. In general, if the plan is severely underfunded, additional mandatory contributions are required. ERISA also mandates that unfunded liability is amortized over 5-30 years. In 1987, Pension Protection Act amended ERISA of 1974 and requires a deficit reduction contribution of between 13.75% and 30% of any underfunding to be deposited into the plan. Retirement Protection Act of 1994 further increases the extent of deficit reduction contributions of pension plans that were severely underfunded. Recently, to further improve the funding status of DB plans and the financial condition of the PBGC, the Pension Protection Act of 2006 was enacted. The act shortens the period that a firm must fully fund its pension plans to seven years in contrast with thirty years previously to fund 90% of the pension liabilities and gives further tax deduction for contributions up to 150% of the pension liability compared to 100% previously. The act also requires greater transparency of financial health of the plans. For instance, in addition to providing more detailed information on pension plans in their Form 5500 filings, firms are required to notify workers and retirees of their pension funding status within 120 days of

the close of the plan year.³ These numerous laws regulating the pension contribution suggest that requirements to make contribution to the pension deficits are binding constraints for managers and thus effectively reduce the agency problem associated with free cash flow.

In our paper, to address the disciplinary role of pension deficits, we focus on the pension funding status of DB plans since pension deficits exist only in DB plans and thus the pension plan in the rest of the paper refers to the DB plan. However, in our empirical analyses below, we include acquiring firms that do not adopt the DB plan as the reference group to draw meaningful inferences about our sample of acquiring firms with DB plans.⁴

B. Main Hypotheses

As we briefly discussed in the introduction section, there are several reasons why the pension deficits can serve as the effective disciplinary mechanism that controls managerial discretion. In this section, we discuss these reasons in more details to provide strong theoretical guidance to our empirical tests. The detailed rationale for the disciplinary role of pension deficits is as follows. First, as one type of debt, pension deficits represent economically a significant portion of a firm's total debt. Furthermore, various pension laws and regulations discussed in the previous section require firms to make mandatory contributions for their underfunded plans. As Jensen (1986) argues, managers with large free cash flow have incentives to over-invest beyond the optimal level and large debt enables managers to effectively bond their promise to pay out future cash flows, thus reducing the agency costs of free cash flow. Since paying a stream of committed pension obligations to retirees and making mandatory periodic contributions to meet future retirement payments for current employees can significantly reduce the free cash flow available to managers, Jensen's (1986) argument suggests that these characteristics of pension deficits limit managers' discretionary behaviors.

³ See Moody's special comment, "Pension Reform Will Increase Funding Requirements for Underfunded U.S. Pension Plans", August 2006.

⁴ In recent years, however, some firms have been freezing or terminating their DB plans and switching to DC plans. For example, according to 2005 report by the PBGC, about 2.5% and 1.5% of all and active participants of DB plans freeze their DB plans in 2003, respectively. An employer freezes a DB plan when it limits the ability of employees to earn benefits in the plan. An employer may have the option to "hard freeze" its pension plan by ending benefit accruals for all employees or to "soft freeze" its pension plan only to newly hired employees.

Second, as a government agency and the ultimate default risk bearer, the PBGC charges higher variable insurance premiums for firms with larger underfunded pension plans. To avoid high insurance premiums, these firms usually use their internal cash flow to make mandatory contributions, which further reduces the cash flow available for spending at the discretion of managers.⁵

Third, pension deficits are considered to be inside debt owed to employees. Fama (1985) argues that inside debtholders such as banks have access to inside information about the borrower that is not available to other debtholders since they are able to participate in an organization's decision process. This provides banks with a significant advantage in monitoring their borrowers. In a similar vein, employees are considered to be an important insider since they not only participate in the daily operation of a firm, but also are able to directly observe daily management decisions. Moreover, compared to public debtholders, employees expend less time collecting information about their employers since they are on-the-spot. These information advantages can provide employees with enhanced monitoring capabilities, and thus stronger incentives to monitor their employers.

Fourth, pension deficits affect employee behavior. Ippolito (1985) argues that underfunded pensions make employees long-term bondholders in the firm and thus give employees a stake in the long-term viability of the firm. This argument suggests that pension status affects job performance of the employees. In addition, Hanka (1998) shows that higher debt is associated with more layoffs, greater reliance on part time and seasonal employees, and lower wages. Since pension deficits have a more direct effect on employee welfare than other conventional debt, the adverse effect of pension deficits, on employees, such as weakening of employee incentives to work hard and a higher turnover rate, is likely to be more severe than the adverse effect of other conventional debt on employees. This stronger negative effect imposed by pension deficits can incentivize managers to be more efficient in their investment decisions because value-destroying investments can further exacerbate such a negative effect on employee behavior.

⁵ Rauh (2006a) provides a detailed discussion on how to estimate mandatory contributions based on the data from the Form 5500 plan-level filings.

Fifth, as an important stakeholder, employees have a senior claim on a firm's assets. For example, Stewart III (2003) describes pension liabilities as follows: "Pension liabilities have real teeth. Whether paid out of cash or bankruptcy proceeds, a company's pension liability is senior even to its most senior lenders." Furthermore, when a firm fails to meet minimum funding requirements, the PBGC is empowered to recover the pension deficit by filing a claim against the firm's assets. Welch (1997) develops a model of debtor monitoring and shows that senior debt, such as bank debt, reduces creditors' monitoring costs via deterrence in a priority contest, thus resulting in a more efficient monitoring. Park (2000) argues that seniority allows the senior lender to appropriate the full return from his monitoring activities. He further shows that monitoring by senior debtholders can more effectively deter a moral hazard problem through detecting a borrower's opportunistic behavior in early stages and punishing it by either liquidation or renegotiation. Thus, these studies suggest that pension deficits as senior debt are able to perform an effective monitoring to discipline managers.

Finally, previous studies show that debt rating agencies incorporate pension deficits into consideration when evaluating a firm's credit rating and large pension deficits lead to a high cost of debt. Cardinale (2007) examines whether pension information derived by accounting disclosures is priced in corporate bond spreads and finds that the extent of unfunded pension liabilities is incorporated in credit spreads and the sensitivity of credit spreads to pension deficits is larger than the sensitivity to ordinary long-term debt. Rauh (2007) also shows that credit rating agencies are more likely to upgrade a firm's credit rating when its pension assets perform well and downgrade the firm's credit rating when its pension assets perform poorly.⁶ To the extent that firms with large pension deficits attract attention of rating agencies and have trouble raising capital and that rating agencies play a monitoring role as financial intermediaries (Boot, Milbourn, and Schmeits (2006)), pension deficits that prompt the change in rating agencies' credit ratings can serve as an indirect surveillance on managerial misbehavior and incentivize managers to take actions that enhance firm value.

⁶ The Pension Protection Act 2006 requires the PBGC to adopt an 80% at-risk threshold to determine whether the underfunding of the pension plan poses a threat to the PBGC. The firms with at risk plans are required to provide detailed information to the PBGC and to the public, which helps credit rating agencies alter their evaluations of the firms in a timely manner.

We empirically evaluate the above arguments for the disciplinary role of pension deficits as follows. First, we investigate whether the likelihood of engaging in acquisitions (diversified acquisitions) and the extent of acquisition expenses are different between DB firms with a large pension deficit and other firms. According to the above arguments, pension deficits reduce a firm's free cash flow and thus provide managers with few incentives to engage in empire building. We therefore expect that DB firms with a larger pension deficit are less likely to engage in acquisitions and spend less on acquisition expenses. In particular, if, as shown by Lang and Stulz (1994), Berger and Ofek (1995), Lins and Servaes (1999), and Lamont and Polk (2002)), the value-reducing consequences of investments are larger for diversified acquisitions than for non-diversified acquisitions, we expect DB firms with a larger pension deficit to be less likely to engage in diversified acquisition.

Second, we examine whether the extent of an acquirer's pension deficits has any impact on the announcement period returns. As we discuss above, firms with large pension deficits are able to overcome free cash flow problems and make better investment decisions. Thus, the disciplinary role of pension deficits suggests that, holding everything else constant, the bidder abnormal returns and the value-weighted portfolio abnormal returns of the bidder and the target are more positive when the bidders have larger pension deficits.

Third, we examine whether the takeover premiums paid by DB acquirers with a larger pension deficit are different from those paid by other acquirers. Our arguments above suggest that pricing decisions of acquisitions are affected by the disciplinary role of pension deficits and pension deficits reduce the extent of managerial hubris (Roll (1986)). Since the interests of employees and those of bidding firms' shareholders are more likely to be aligned when bidding firms have larger pension deficits, we expect that DB acquirers with a large pension deficit pay fewer takeover premiums to their targets than other acquirers.

Finally, the disciplinary role of pension deficits suggests that the extent of pension deficits affects the choice of the method of payment in acquisitions. Harford, Klasa, and Walcott (2009) find that acquirers use a smaller fraction of cash for their acquisitions when they are highly leveraged, while

Shleifer and Vishny (2003) and Dong, Hirshleifer, Richardson, and Teoh (2006) show that acquirers are more likely to use cash as a method of payment when they acquire undervalued targets. Thus, if the pension deficit is simply a part of debt, the extent of an acquirer's pension deficits will be negatively related to the fraction of cash used in target payment. However, if pension deficits serve as an effective controlling mechanism and thus influence managers to make better acquisition decisions (i.e., to choose undervalued targets), then we expect the fraction of cash used in target payment to be positively related to the extent of an acquirer's pension deficits.

II. Sample, Summary Statistics and Empirical Methodology

A. Sample

We start off with all U.S. based firms covered by Compustat over the 1988 to 2007 period.⁷ We select 1988 as the starting point because Statement of Financial Accounting Standards (SFAS) 87 by the Financial Accounting Standards Board (FASB), mandating many of the current pension reporting requirements, became effective for firms with fiscal years beginning after December 15, 1986. Beginning in 1988 ensures that all firms report under SFAS 87 and comply with the new requirements. We rely on Compustat to construct our sample and extract pension plan assets and pension projected obligations to construct the pension deficit/surplus measure.⁸ Moreover, we require that these firms have corresponding stock price and shares outstanding from the Center for Research on Security Prices (CRSP) database. After merging the two datasets and deleting DB firms without information on pension funding status, the final sample is an unbalanced panel containing 90,037 firm-year observations.

[Insert Table 1 here]

⁷ Compustat maintains a separate database on firms' pension information.

⁸ As pointed out by Rauh (2006) and Shivdasani and Stefanescu (2009), Compustat does not differentiate domestic and foreign pension information. However, this difference is minor to our results in that both domestic and foreign employees as insiders are able to affect manager's behaviors. Form 5500 from the Department of Labor (DOL) is an alternative data source. Pension plan sponsors are required to file a return with the DOL. These returns contain detailed information about the plans' finances, participants, and administrators that allows government agencies to monitor compliance with the ERISA and the Internal Revenue Code. However, Form 5500 only includes domestic pension information and it significantly limits the sample size since these filings are only available for fiscal years from 1990 through 1998.

Table 1 summarizes the sample. Approximately one quarter of public firms have DB plans.⁹ Untabulated results suggest that the use of DB plan primarily clusters in traditional industrial companies such as automotive, construction and chemicals, but is less pervasive in high-tech industries such as software and telecom services. DB sponsors are more prevalent during 1980s as a result of its historical importance in helping millions of workers attain an economically secure retirement. The trend is reversed in 1990s, reflecting a shift from DB plans to DC plans. Many DB sponsors argue that DB plans imposes a costly burden on plan sponsors since recent market conditions lead to an unprecedented decrease in pension funding levels and high-profile pension collapses.¹⁰ The trend has seen a subtle rebound lately. The mean and median values of pension plan assets (PPA) over total assets show that during 1990s pension plans widely experience large surpluses, while projected benefit obligations (PBO) over total assets are relatively stable during the whole period. Funding status displays a similar pattern with 2000 as a turning point, after which funding status deteriorates gradually.¹¹ Due to weak stock market as well as low interest rates, the mean pension deficit has reached as high as 2.1% (1.3% for the median value) of the book value of total assets by the 2007 fiscal year end.

We collect data on M&As from the SDC database and require transactions to meet the following criteria:

- (1) The transaction is completed.
- (2) Acquisitions in which the acquiring firm ends up with all the shares of the acquired firm or subsidiary and acquiring firm control less than 50% of the shares of the target firm before the announcement date.
- (3) A public or private U.S. firm or a non-public subsidiary of a public or private firm are acquired.
- (4) The acquirer is a public firm listed on the CRSP and Compustat during the event window.

⁹ Our sample distribution is commensurate with Shivdasani and Stefanescu (2009) during 1991 to 2003.

¹⁰ Several papers discuss the valuation effect of pension plan freezes and termination. See Rubin (2007), Butrica et al. (2009), Milevsky and Song (2008) and McFarland, Pang and Warshawsky (2009).

¹¹ Funding status is scaled by total assets following Rauh (2006, 2007). Franzoni and Marin (2006) discuss the advantage of not scaling by market value of assets as they recognize a mechanical correlation between funding status and the market-to-book ratio.

- (5) The deal value disclosed in the SDC relative to the acquirer's market capitalization at the end of the fiscal year prior to the acquisition announcement is at least 1%.

B. Summary Statistics of Firm and Deal Characteristics

Panel A of Table 2 reports the information of firm characteristics of the whole sample, while Panel B reports the information of deal characteristics of a subsample for which we can calculate announcement abnormal returns. In both panels, we present the information for DB and non-DB firms respectively. DB firms are further partitioned into pension deficit and pension surplus groups. To mitigate the impact of extreme observations, all variables are winsorized at the 0.5% level on each tail. All dollar values are converted into 2000 constant dollars using the GDP deflator.

[Insert Table 2 here]

The comparison of firm characteristics between DB and non-DB firms reveals that the dollar value of book assets is much larger for DB firms than non-DB firms. DB firms are also older and have more employees. This is not surprising given the historical popularity of DB plans. DB firms also have lower market-to-book ratios and sales growth in terms of growth opportunities. Meanwhile, DB firms hoard less cash but hold more cash flow as a result of higher profitability measured by return on assets (*ROA*). Financial distress and earnings volatility are lower for DB firms. At the industry level, DB firms tend to have higher unionization rate and longer employee tenure.

Within DB firms, difference of book assets for firms with pension deficit and pension surplus is much smaller than the difference between DB and non-DB firms on average. Firms with pension surpluses are older and have fewer growth opportunities and less cash, implying that firms build financial slacks which can be used for profitable investment projects in the future. This is consistent with the findings of Ballester, Fried and Livnat (2009). Additionally, firms with pension deficit are more likely to be unprofitable firms and have higher financial distress and earnings risk. Despite no statistically difference in number of employees, firms with pension surpluses have both higher employee tenure and unionization rate, which supports the notion that employees are more capable to protect their benefits by

joining the unions and better retirement benefits for employee are also strong incentives to retain employees. Last, pension deficit does squeeze the capacity of debt a firm can borrow.

Panel B gives us an overview of the deal characteristics. The competition in the target industry is not so fierce for non-DB acquirers and the relative deal size is around 8% larger for acquisitions done by DB firms, among which the proportion of diversifying deals is higher with a difference of 3% but lower in terms of high-tech deals with a difference of 17%. As for target status, DB firms are more likely to acquire public firms and subsidiaries. Although hostile and competing deals and tender offers are more prevalent for DB firms, the magnitude is out of economic significance. The *t*-test for method of payment indicates that DB firms tend to use pure cash rather than pure equity. Within DB firms, deals made by firms with pension deficits, compared with firms with pension surpluses, present qualitatively similar characteristics to those made by non-DB firms except that these deals are less likely to be fully paid by stocks of the bidding firm. Meanwhile, no obvious differences on diversifying, competing, pure cash or subsidiary target are observed.

C. Sample Selection Issue

We examine the impact of acquirers' pension plan funding status on different aspects of acquisition activities by conducting regression analysis. Nevertheless, we cannot simply ignore the sample selection bias. In particular, we need to understand how a firm is self-selected as a DB plan sponsor since pension deficit is unobservable for a firm that does not organize DB plan and take the influences of non-sponsors into account. To address this issue, we take two approaches. In the first approach, a dummy variable denoting whether a firm is a DB sponsor is added in the model. For convenience, we use non-DB dummy in the analysis elsewhere. Accordingly, we force the pension deficit to be zero for all non-DB firms. By doing so, the coefficient of pension deficit captures the impact of pension deficit on acquisitions, while the non-DB dummy captures the difference between DB and non-DB firms.

In the second approach, we employ Heckman selection equation to address the selection issue. Under this framework, we determine the choice of DB plan by using the following model:

$$y = a_0 + a_1x + a_2z + \varepsilon \tag{1}$$

$$DB\ plan = 1\ if\ y > 0\ and\ DB\ plan = 0\ if\ y \leq 0$$

In equation (1), the latent y is the expected net benefit from organizing a DB plan. Although the net benefit of sponsoring a DB plan is unobservable, a firm becomes a DB plan sponsor when the expected net benefit is positive or a non-sponsor otherwise. As a consequence, the *DB* dummy is used in the first stage selection equation.¹²

Besides a number of common determinants (x) of both the choice of DB plan and the M&A policies, we also include two instrumental variables (z) that are only correlated with the likelihood that a firm organizes DB plan in accordance with Shivdasani and Stefanescu (2009). The first instrument is the median unionization rate of an industry, which is defined as the percentage of workers covered by a collective bargaining agreement. According to the Bureau of Labor Statistics (BLS) *Employee Benefits Survey*, DB plans tend to be more prevalent among union workers than among nonunion workers. However, it should be orthogonal to a firm's M&A policies. We collect annual industry unionization rates for the 1988 to 2007 period from the *Current Population Survey (CPS) Union Membership and Coverage Database* compiled by Hirsch and Macpherson (2003).¹³ This database reports industry unionization rates for 3-digit Census Industry Classification (CIC) industries. We then match the CIC code with the 4- or 3-digit SIC code and assign industry unionization rates to our sample firms. The second instrument is employee tenure, which is also not related to the acquisition decision of a firm. The median employee tenure data are obtained from the CPS maintained by the BLS and are matched to Compustat data at the 2-digit SIC code.

Other control variables (x) are consistent with previous literature. For instance, Petersen (1994) documents that the financial characteristics of a firm such as profitability and its volatility could influence the type of pension plan the firm offers. Correspondingly, we include return on assets (*ROA*) and earnings volatility in our regression models. Leverage, tax rate and market to book ratio (*MB*) are used

¹² We require that a firm reports both pension plan assets and pension liability if a firm has the DB plan. In other words, if either is missing, it is excluded from the analysis. If both are missing, we define this firm as a non-DB firm. If both reported pension plan assets and pension liability are zero, we also view it as a non-DB firm.

¹³ See Hirsch and Macpherson (2003) for details on the construction of this unique and comprehensive dataset.

based on the capital structure theories: (1) pension deficit is taken into account by debt rating agencies and high pension deficit leads to high cost of debt (Hann, Hefflin and Subramanyam (2007)). Firms are less conservative in using debt once pensions are considered, (2) tax is a strong incentive for a firm to choose DB plan as pension contributions are tax deductible (Shivdasani and Stefanescu (2009)), (3) financial distress is more costly for growth firms (Rajan and Zingales (1995)). To mitigate the causality issue, we lag all control variables one period except firm age and earnings volatility.

The estimation of the probit model of DB plan choice is shown in Appendix A. As expected, a firm is more likely to sponsor a DB plan when it is large and old and has fewer employees. Higher profitability and lower earnings volatility increase the probability of becoming a DB firm. MB, leverage and tax rate are significant and their coefficients are consistent with our expectation. Two instrumental variables are positively associated with the likelihood of choosing a DB plan, confirming our conjectures.

III. Empirical Results

A. Acquisitiveness and Acquisition Expenses

We test whether a firm with larger pension deficit is less acquisitive in the corporate control by using all Compustat observations. To this purpose, a firm is defined as an acquirer if a firm does any merger or acquisition in a fiscal year based on the information from the SDC database.

We estimate the probit regression for the likelihood of being an acquirer, where control variables are all known determinants of acquisition likelihood and are measured at the fiscal year end prior to the announcement date. Moeller, Schlingemann and Stulz (2004) attribute the size effect to the managerial hubris. Zhang (2006) documents that firms with long history are more likely to belong to mature industries. These firms tend to have more fixed assets (*Tangibility*) and fewer growth opportunities that are captured by low market-to-book ratio (*MB*) and sales growth. Harford (1999) argues that cash-rich firms are more likely than other firms to attempt acquisitions. But an alternative view is that high-growth firms tend to hold more cash (Mikkelsen and Partch (2003)). Hence the effects on acquisition likelihood are not clear yet. To keep consistent with corporate investment literature, we also control for cash flow

that is exactly the same measure used by Kaplan and Zingales (1997). An interaction term of MB and cash flow as a proxy for the agency problem is employed in response to the findings of Lang, Stulz and Walkling (1991).

Prior literature also suggests that a firm is more likely to make acquisitions when it is performing well, where performance is measured by two proxies: return on assets (*ROA*) and the stock price run-up during the 12 months prior to an acquisition announcement. Earnings volatility and financial distress measured by Altman's z-score are also included since they can lead to corporate diversification for the purpose of reducing risk.

[Insert Table 3 here]

We present estimates for the probit regression model in the first three columns in Table 3.¹⁴ In column (1), pension deficit for a DB firm has a strong negative impact on the likelihood of being an acquirer. In economic significance, one standard deviation increase in pension deficit/total assets reduces the probability that a firm becomes an acquirer by 0.67% (0.54% for the regression unconditional on pension plan status in column (2)). In addition, larger firms are more likely to become acquirers, while mature firms with more fixed assets, less cash holdings and lower sales growth are less acquisitive. The interaction term capturing the agency problem has a negative impact on the acquisition likelihood as expected. DB firms experiencing stock price run-up in the past 12 months prior to the announcement are more prone to becoming an acquirer. Despite a negative sign of z-score, another risk measure, earnings volatility is insignificant. Leverage as predicted reduces a firm's acquisition tendency.¹⁵

The model in column (2) assumes that the pension deficit is zero if the firm is a non-DB firm and includes a non-DB dummy and the model in column (3) utilizes the Heckman selection technique. Our results do not change qualitatively for both models and suggest that pension deficit significantly lower the probability of being an acquirer for a firm. The non-DB dummy in column (2) is positively associated

¹⁴ Due to missing variables for the selection equation of DB plan such as employee tenure and unionization rate at the industry level, we lose several observations for the sample in the Heckman's framework.

¹⁵ Time trend shows that before or after 2000, pension deficit has negative impact on the likelihood of making acquisitions but the effect is stronger in the post 2000 period.

with acquisition likelihood, consistent with our previous findings that non-DB firms are young, small and thus more likely to use mergers and acquisitions to achieve growth.¹⁶

Subsequently, we follow Elsas, Flannery and Garfinkel (2006) and employ acquisition expenses (*Acq_Exp*) from cash flow statement as our dependent variable. This item represents cash outflow of funds used for and/or the costs relating to acquisition of a company in a year or effects of an acquisition in a prior year carried over to the current year.

We summarize the results in the last three columns in Table 3. Similar to the result of the probit regression, pension deficit significantly reduces the acquisition expenses of a firm, validating the findings of reduced corporate investments under financial constraints. Turning to the economic significance, on average one standard deviation increase in pension deficit over total assets leads to a 0.15% decrease in acquisition expenses scaled by total assets (0.14% for the regression unconditional on pension plan status in column (5)). In addition, logarithm of book assets is not an important determinant of acquisition expenses for a DB firm and is even negatively associated with acquisition expenses, which can be explained by the findings of Moeller, Schlingemann and Stulz (2004) that acquisitions by small firms are larger relative to their sizes. Compared with results for the full sample in column (5) and (6), cash, *MB*, and earnings volatility in model in column (4) are not related to acquisition expenses when only DB firms are considered. Leverage does not have any effect for both DB firm sample and full sample, though. Surprisingly, non-DB dummy is significantly negative on acquisition expenses, implying that the deals done by large and mature firms despite less likely are more costly.

B. Acquisition Efficiency

We create a dummy variable as the dependent variable that takes a value of 1 if a firm makes any diversifying acquisition in a year and 0 otherwise. Explanatory variables are the same as those used in prior section.

¹⁶ As a robustness check (unreported), we also use the number of acquisition a firm makes in a year as the independent variable using negative binomial regression and the results show that acquisition frequency of a firm is negatively related to the pension deficit.

To be comprehensive, our results include both conditional and unconditional regressions depending on whether the firm is an actual acquirer or not. We treat the number of diversifying bids as zero for non-acquirers in the unconditional regression.

[Insert Table 4 here]

The results are presented in Table 4. Pension deficit has a significant and negative relation with the propensity of bidder's diversification strategy for all specifications. The economic significance for conditional and unconditional models on acquirer status in column (1) and (4) is 1.96% and 0.41% decreases in the likelihood of making diversifying acquisition per one standard deviation increase in pension deficit over total assets respectively holding other variables at the mean level (0.82% and 0.83% for regressions unconditional on pension plan status in column (2) and (5)). Control variables are in accordance with predictions by theories. Different from the acquisition strategy of growth firms, diversification is a major method to expand for mature firms that are lack of growth opportunities in spite of insignificant coefficients in some specifications.

The empirical evidence reveals that diversifying deals done by entrenched managers are seriously limited by pension deficit, reflecting that employees, when their retirement benefits are tied to the firm's performance via pension contribution, are able to effectively monitor and discipline managers' empire building behaviors in the corporate control market. Our result supports Blair (1999) who shares the view that workers, as important stakeholders, could exert managerial power and participate in the governance of a firm.

C. Bidder Returns around Deal Announcements

Since how investors react to the situation and how pension plan funding status is related to the wealth of the shareholders are still unclear, we estimate shareholder gains from acquisitions by considering the announcement effect of a deal. The number of observations is reduced because we require that announcement abnormal return can be calculated. Finally, the subsample contains 18,452 transactions, among which 4,736 deals are made by DB firms and 13,716 by non-DB firms. At the same

time, 2,822 deals are made by firms with pension deficit. Cumulative Abnormal Returns (CAR) is calculated based on Moeller, Schlingemann and Stulz (2004) using market model with the CRSP equally-weighted index returns as the benchmark. The parameters for the market model are estimated over the (-205,-6) interval.¹⁷ We estimate abnormal returns over three event windows, i.e., (0,0), (-1,+1) and (-2,2). Univariate analysis of announcement abnormal returns is reported in Table 5. On average, shareholders of acquiring companies benefit from acquisitions. Comparison of non-DB and DB firms indicates that announcement abnormal return is remarkably higher for non-DB firms. Significant differences of 0.65%, 0.86% and 0.88% are observed between DB and non-DB firms for the three event windows respectively. In Panel B, we classify deals made by DB firms into five groups based on their pension plan funding status each year. Basically the announcement abnormal return monotonically increases with the pension deficit and *t*-test shows that the difference of the most underfunded quintile versus the most overfunded quintile is larger than 1% for all three event windows and significant at the 1% level.

[Insert Table 5 here]

Multivariate analysis is more reliable since firm and deal characteristics strikingly differ between firms with high and low pension deficit. Control variables include not only common firm characteristics such as size market-to-book ratio, cash flow, stock price run-up and leverage but also deal characteristics based on prior literature.¹⁸ Following Masulis, Wang and Xie (2007), we employ a proxy for the competition of corporate control in the target industry, which is calculated as the value of all deals reported by SDC for each prior year and 12 Fama-French industry divided by the total book value of assets of all Compustat firms in the same Fama-French industry and year. Relative deal size is added based on Moeller, Schlingemann and Stulz (2004).

The findings that conglomerate acquisitions usually destroy shareholder wealth but potentially benefit self-interested managers by Morck, Shleifer and Vishny (1990) suggest a '*Diversify*' dummy. Furthermore, Fuller, Netter and Stegemoller (2002) document that acquiring firms experience

¹⁷ We also calculate abnormal returns by subtracting the value-weighted CRSP market return from the firm's stock return and our results are not sensitive to different benchmarks.

¹⁸ Stock price run-up for announcement and portfolio returns is different from the definition in the prior section. In particular, we follow Masulis, Wang and Xie (2007) and use buy-and-hold abnormal return over the 200 day window (event days -205, -6) with the CRSP value-weighted market index as the benchmark.

significantly negative abnormal return when buying public targets and significantly positive abnormal return when targets are private firms or subsidiaries. To avoid perfect multicollinearity, we construct two dummies to represent the status of the target. High-tech dummy and hostile dummy are suggested by Loughran and Ritter (2004) and Shleifer and Vishny (1986) respectively. Besides, acquiring firm shareholders gain more with tender offers but lose more for competed deals. In addition, the method of payment is also frequently studied in M&A research. The adverse selection theory predicts that acquiring firms experience significantly negative abnormal returns when they pay equity for the acquisition. However, Fuller, Netter and Stegemoller (2002) find that the stock price could be even positive for private target in case of stock-financed deals and argue that it is the creation of the new blockholders who are active monitors.¹⁹

Regression results are shown in the first three columns of Table 7, where we report the (-1,+1) window.²⁰ Consistent with our anticipation, shareholders of acquiring firms react favorably to high pension deficit acquirers, which translates to an average 0.22% increase in three-day CAR per one standard deviation increase in acquirer's pension deficit over total assets (0.13% for the regression unconditional on pension plan status in column (2)). This implies that market participants value the governance role of employees who align manager's interest with that of shareholders in this scenario. Full sample and Heckman tests also give the similar implications. For control variables that are unanimously significant in all three specifications, relative deal size is positively associated with announcement return, while firm size, public and private targets and stock price run-up are negatively associated with announcement return.

D. Value-weighted Portfolio Returns of Bidders and Targets around Deal Announcements

Bidding firm shareholders seem to benefit themselves in case of high pension deficit but one concern is that whether it is just a transfer of wealth between shareholders of bidding and target firms. To address

¹⁹ We replace target ownership status and deal payment method with six interaction terms suggested by Masulis, Wang and Xie (2007), namely, public all-cash deal, public stock-deal, private all-cash-deal, private stock-deal, subsidiary all-cash-deal and subsidiary stock-deal. To avoid perfect multicollinearity, only five of them are included in the regression models and our results still hold.

²⁰ We report the (-1,+1) window but our results are robust using other event windows such as (0,0) and (-2,+2).

this issue, we focus a subsample of firms, where we can calculate the announcement abnormal returns of both bidders and targets.

Since stock price data is required to calculate announcement abnormal return of the target, our sample is reduced to 873 observations for the DB sample and 2,138 observations for the full sample. Our synergy measure is based on the method suggested by Bradley, Desai and Kim (1998). In detail, we start by forming a time-series of portfolio returns in event time for each sample transaction, where the portfolio is a value-weighted average of the three-day (-1,+1) target and bidder CAR (WCAR) based on their market capitalizations two days prior to the announcement date. Abnormal returns are defined as market model residuals, with the parameters estimated over the (-205,-6) event window relative to the announcement day.

[Insert Table 6 here]

Table 6 reports the summary statistics of the synergistic gains. The first row of Panel A shows that the value-weighted three-day announcement abnormal returns do not display visible difference for DB and non-DB firms. However, the gap is noticeable for firms with pension deficit and surplus and mounts up to 1.53%. Partition of DB firms in the first row of Panel B indicates that the synergies created by acquirers in highest deficit quintile are 2.01% higher than those in the lowest quintile.²¹

To be more parsimonious, we also add target's firm characteristics as control variables in the regression in addition to acquirer's firm and deal characteristics. The last three columns of Table 7 present the results.

[Insert Table 7 here]

Apparently, high pension deficits of bidding firms produce high synergies, reflecting the fact that the deal is efficient and market participants are able to foresee the synergies created as well. On average one standard deviation increase in acquirer's pension deficit scaled by total assets yields a 0.55% increase in the weighted average announcement abnormal return, more than twice as high as that for acquirer

²¹ Our sample size is significantly reduced as we require that the status of target firms must be public, which makes an uneven yearly distribution of our sample. Hence it is not appropriate to form quintiles based on both pension deficit and year. Hence we group firms only based on pension funding status. The same explanation and methodology applies to premium analysis in section III.E as well.

shareholders (0.42% for the regression unconditional on pension plan status in column (5)). Result should be interpreted with caution as the subsample in this section only takes public targets into account. The signs of other control variables are comparable with previous findings. For instance, pure-cash deals are signaling to the market that targets are undervalued, thus a higher synergistic gain. Hostile deals in our sample predict high gains for the combined firm and one possible explanation is that incumbent managers are replaced in such a deal (Schwert (2000)).

E. Premium Paid by Bidders

Our measure of premium follows Moeller, Schlingemann and Stulz (2004) and is defined as the aggregate value of cash, stock, and other securities offered by the bidder to the target shareholders minus target's market value of equity 50 days prior to the takeover announcement date reported by the SDC database, scaled by target's market value of equity on the same day.²² We also follow Officer (2003) to truncate the variable at zero and two.

The second row of Panel A in Table 6 shows that non-DB firms and firms with pension surpluses pay about 4% more for the target and the gap is more remarkable within DB groups. The second row of Panel B indicates that firms in the lowest deficits quintile pay 10.41% more than firms in the highest deficit quintile. We note that there is a small reversion of premium at the highest deficit quintile and we discuss the reason in section IV.

Our choice of control variables closely follows Moeller, Schlingemann and Stulz (2004). The only variable not described in previous sections is a toehold dummy, denoting if the acquirer holds at least 5 percent of the target shares.²³ Additionally, according to Moeller, Schlingemann and Stulz (2004), the subsample is biased towards large firms as they are more likely to acquire public targets. Logarithm of market capitalization 50 days prior to the announcement is employed as the size measure to capture

²² Moeller, Schlingemann and Stulz (2004) discuss pros and cons of different measures of premium and argue that this is the best approach in understanding the announcement abnormal returns.

²³ This variable is zero for our subsample only including DB firms. Heckman selection equation thus drops this variable as well.

meaningful variation.²⁴ Last, we add a dummy to distinguish public or subsidiary target in our sample to take into account the evidence by Fuller, Netter and Stegemoller (2004) that there is a liquidity discount when bidders buy subsidiary targets.

[Insert Table 8 here]

The results in Table 8 relate the higher pension deficit to the lower premium paid by bidders in all three models, which is consistent with our expectation. The magnitude is of economic importance as one standard deviation increase in pension deficit/total assets of a bidding firm lowers 2.81% premium paid at the mean level (1.54% for the regression unconditional on pension plan status in column (2)). The predictions of control variables are also congruent with theories or previous findings. For instance, competing bids and tender offers drive higher premiums.²⁵ Firms using cash to finance transactions are less subject to adverse selection problem, thus a strong negative association with the premium. Similar to Rossi and Volpin (2004) and Rau and Vermaelen (1998), we also find that target size has a significant and negative relation to the premium and glamour bidders (high MB) are willing to overpay.

F. Method of Payment

Following Harford, Klasa and Walcott (2009), we use fraction of cash payment (*Pct_Cash*) in a transaction from the SDC database as our dependent variable and the choice of control variables mainly follows Harford, Klasa and Walcott (2009). In particular, the relative size of target to bidder, calculated as the natural logarithm of market capitalization of target over market capitalization of acquirer 50 days prior to the announcement, is controlling for bidders' propensity to pay for the target with equity when a target is larger relative to the bidder; bidder firm size is measured using the natural logarithm of consumer price index-adjusted market value of assets; cash/total assets is added according to the pecking order theory that predicts firms prefer to finance their investments with internal cash or debt rather than equity as a result of information asymmetry; target status is also controlled for since subsidiary targets are

²⁴ As a robustness check, we replace book value of assets in previous sections with market capitalization as an alternative measure for firm size and our results do not change qualitatively.

²⁵ Rossi and Volpin (2004) interpret this as evidence of the free-rider hypothesis, i.e., the bidder in a tender offer needs to pay a higher premium to induce shareholders to tender their shares.

subject to more information asymmetry and become less attractive in the corporate control market (Fishman (1989) and Eckbo, Giammarino and Heinkel (1990)). Deal characteristics such as tender offer, hostile and competed deals are included according to Rossi and Volpin (2004) and other firm characteristics such as MB for acquirers and target and leverage ratio are added in accordance with Dong et al. (2006).

[Insert Table 9 here]

The results are summarized in Table 9. Due to data restrictions on cash payment fraction, our sample shrinks to 554 deals by 406 DB firms and 1,099 deals by 892 firms for the full sample. Consistent with our expectation, pension deficit is positively associated with percentage of cash paid by bidders. Quantitatively, one standard deviation increase in pension deficit/total assets of a bidding firm leads to a 2.86% increase in fraction of cash payment on average (2.23% for the regression unconditional on pension plan status in column (2)). Besides, relative target size and size of acquirer are negatively associated with percentage of cash payment, while tender offer and diversifying deals have a positive relation. Acquirers making diversifying deals are more likely to pay cash since firms lack of growth opportunities usually have plenty of free cash flow on hand, which is consistent with Kaplan (2006).

Another concern is that one may regard method of payment as an endogenously determined variable and market should be able to sense it. In an unreported test, we include an interaction term of pure cash deal dummy and pension deficit and its coefficient is significant and positive in the regression of announcement effect, confirming the notion that investors take the medium of payment into account when the deal is announced. It also supports our conjecture that it is highly possible that these targets are undervalued.

IV. Robustness Checks

Masulis, Wang and Xie (2007) argue that acquirer returns are negatively affected by the quality of corporate governance. By utilizing three sets of anti-takeover provisions (ATPs) from the Investor Responsibility Research Center (IRRC) database, i.e., GIM and BCF indices and classified board dummy,

they find that entrenched managers protected by more ATPs face weaker discipline from the market for corporate control and hence destroy shareholder value by making unprofitable acquisitions.²⁶ On the same front, we control for these indices for our regressions of bidder and portfolio returns, premium and fraction of cash payment and the results are quite robust.

Hanka (1998) breaks debt into piecewise variables to examine effects of different debt level on employment terms. In the same vein, piecewise regressions in our analyses show that most of the disciplinary effect of pension deficit comes from large pension deficit. This is consistent with our conjecture that employees usually take actions to protect themselves and influence corporate policies when pension funding risk is exposed and perceived. The only exception is premium. Specifically, it is firms with pension surpluses overpay for the targets that drives the result. We observe the same pattern in Panel B of Table 6 in section III.D. One potential explanation is that targets are undervalued for deals involving bidders with large pension deficits. This is also supported by our findings in the fraction of cash payment in section III.F. To further prove the possibility, we add interaction terms of target market-to-book ratio with piecewise variables of acquirer's pension deficit to capture the valuation issue. Empirical evidence confirms our belief.

Several papers discuss the implications of mandatory contribution (Rauh (2006) and Franzoni (2009)). Campbell, Dhaliwal and Schwartz (2009b) develop two publicly available proxies for the mandatory contribution. They also replicate the paper of Rauh (2006) with both measures and results are both quantitatively and qualitatively similar. We hence utilize these two measures to distinguish our point of view from the cash flow story. Regression results show that contribution itself is not able to generate significant results for bidder and portfolio returns, premium and diversifying acquisitions but reduces acquisition likelihood, acquisition expenses and percentage of cash payment. These findings support our view that pension deficit represents an incentive mechanism, whereas contribution only has a

²⁶ See Gompers, Ishii and Metrick (2003), Bebchuk, Cohen, and Ferrell (2009) and Bebchuk and Cohen (2005) for the construction of these indices.

mechanical effect for financially constrained firms, i.e., cash flow reduction leads to lower level of investment.

In another test, we decompose pension deficit into two components: pension deficit change and prior year pension deficit scaled by total assets in the current year. Regression results still favor our findings that it is last year's pension deficit that matters. On the other hand, pension deficit change that is usually highly correlated with the cash outflow incurred by pension contribution in that year is not the driving factor.

Last, we add industry dummies to our empirical models and our results except the one concerning premium using Heckman selection equation are not sensitive to industry dummies.

V. Summary and Conclusion

Despite the fact that pension deficits as employees' debt claims on the firms have increased significantly during the past two decades, there are few empirical studies that examine how these claims affect firms' investment decisions and firm value.

In this paper, we investigate this unexplored issue using a large sample of M&As during the 1988-2008 period and show that pension deficits play an important disciplinary role in controlling managerial discretion in M&A decisions. Specifically, we find that firms with larger pension deficits are less likely to engage in M&As, particularly diversifying M&As, and spend less on their M&A activities. We also find that bidders' pension deficits have a significant positive effect on bidder announcement returns and value-weighted portfolio returns of the bidders and the targets. Compared to acquirers with smaller pension deficits, those with larger pension deficits pay fewer takeover premiums to their targets and use more cash as the method of payment. These results are robust to sample selection bias and endogeneity issues. Overall, our results suggest that corporate pension deficits serve as an effective disciplinary mechanism that influences managers to make value-enhancing investment decisions.

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Table 1: Sample distribution and time pattern

Our sample is composed of all firms available in both the Compustat and the Center for Research on Security Prices (CRSP) databases from 1988 to 2007. We require firms to have non-missing data on pension plan assets (PPA) and projected benefit obligation (PBO). The final data set is an unbalanced panel consisting of 25,362 firm-year observations. All variables are winsorized at 0.5% and 99.5% of their distributions and variable definitions are in Appendix B.

Year	N	% of DB firms	PPA/Assets		PBO/Assets		Funding status/Assets	
			Mean	Median	Mean	Median	Mean	Median
(1)	(2)	(3)	(6)	(7)	(8)	(9)	(10)	(11)
1988	4,169	30.9%	13.6%	9.6%	12.4%	8.5%	1.3%	0.6%
1989	4,071	32.4%	13.3%	9.2%	12.2%	8.3%	1.1%	0.4%
1990	4,007	32.6%	14.2%	9.8%	12.8%	8.8%	1.3%	0.6%
1991	4,046	32.1%	13.6%	9.2%	13.2%	9.2%	0.3%	0.0%
1992	4,198	31.5%	15.3%	10.1%	14.5%	9.7%	0.8%	0.1%
1993	4,447	30.2%	15.4%	10.2%	14.9%	10.1%	0.4%	-0.1%
1994	4,702	29.0%	15.8%	10.1%	16.2%	10.7%	-0.4%	-0.5%
1995	4,886	28.6%	14.3%	9.1%	14.5%	9.7%	-0.3%	-0.4%
1996	5,046	27.2%	15.4%	10.1%	15.7%	10.7%	-0.3%	-0.4%
1997	5,423	25.0%	15.7%	10.3%	15.2%	10.4%	0.5%	0.0%
1998	5,479	23.9%	16.8%	10.9%	15.6%	10.5%	1.2%	0.1%
1999	5,210	24.2%	16.7%	10.8%	16.2%	10.8%	0.5%	-0.2%
2000	4,985	23.5%	17.0%	10.2%	14.8%	9.4%	2.2%	0.5%
2001	4,892	23.7%	15.4%	9.3%	14.4%	9.2%	1.1%	0.0%
2002	4,600	25.6%	14.2%	8.4%	15.6%	10.0%	-1.4%	-0.9%
2003	4,304	27.7%	12.2%	7.2%	16.4%	10.4%	-4.1%	-2.6%
2004	4,064	29.1%	13.2%	7.5%	16.7%	10.6%	-3.5%	-2.1%
2005	3,941	29.9%	13.4%	8.1%	16.8%	10.8%	-3.4%	-2.1%
2006	3,867	31.1%	13.7%	8.0%	17.1%	10.7%	-3.5%	-2.1%
2007	3,700	31.5%	13.6%	7.4%	15.7%	9.4%	-2.1%	-1.3%
Total	90,037	28.2%	14.7%	9.3%	15.0%	9.8%	-0.4%	-0.4%

Table 2: Summary statistics

This table shows the summary statistics of our sample firms from 1988 to 2007. Sample firms are partitioned into sponsors (pension deficit/surplus) and non-sponsors of DB plans and *t*-statistic is reported for the difference of the mean values. Panel A shows the statistics of firm characteristics for the full sample measured at *t-1* (No. of employees and earnings volatility are measured at *t*). Panel B shows the statistics of deal characteristics for the announcement effect sample. All variables are winsorized at 0.5% and 99.5% of their distributions and *t*-statistics that are significant at 10%, 5%, and 1% are marked with *, **, *** in superscripts, respectively. All dollar values are converted into 2000 constant dollars using the GDP deflator. Variable definitions are in Appendix B.

Variables	All firms		DB firms						Non-DB firms		Diff (7)-(5)	Diff (9)-(3)
	Mean	N	All		Pension deficit		Pension surplus		Mean	N		
			Mean	N	Mean	N	Mean	N				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)		
<i>Panel A: Firm characteristics</i>												
Assets (\$mil)	1669.53	90,037	4240.83	25,362	4354.11	15,234	4070.45	10,128	661.21	64,675	-283.67**	-3579.63***
Firm age (yrs)	14.62	90,037	25.07	25,362	23.13	15,234	27.99	10,128	10.52	64,675	4.86***	-14.55***
No. of employees (mil)	6.51	84,465	14.35	24,651	14.25	14,785	14.49	9,866	3.28	59,814	0.24	-11.07***
MB	2.12	90,037	1.55	25,362	1.58	15,234	1.50	10,128	2.34	64,675	-0.08***	0.79***
Sales growth	0.33	90,037	0.12	25,362	0.13	15,234	0.11	10,128	0.42	64,675	-0.01**	0.29***
Cash/Assets	0.18	90,037	0.08	25,362	0.09	15,234	0.07	10,128	0.22	64,675	-0.02***	0.14***
CF/Assets	-0.01	90,037	0.09	25,362	0.09	15,234	0.10	10,128	-0.04	64,675	0.01***	-0.13***
ROA	-0.01	90,037	0.08	25,362	0.08	15,234	0.09	10,128	-0.05	64,675	0.01***	-0.13***
Z-score	0.92	90,037	1.85	25,362	1.79	15,234	1.94	10,128	0.55	64,675	0.14***	-1.30***
Earnings volatility	0.14	90,037	0.04	25,362	0.05	15,234	0.04	10,128	0.18	64,675	-0.01***	0.14***
Employee tenure (yrs)	4.81	79,882	5.70	22,401	5.56	14,080	5.93	8,321	4.46	57,481	0.37***	-1.24***
Unionization rate (%)	13.61	79,423	19.62	24,011	17.83	14,214	22.23	9,797	11.00	55,412	4.41***	-8.62***
Leverage	0.22	90,037	0.28	25,362	0.28	15,234	0.28	10,128	0.20	64,675	0.00**	-0.08***
<i>Panel B: Deal characteristics</i>												
Liquidity index	0.16	18,452	0.12	4,736	0.13	2,822	0.10	1,914	0.18	13,716	-0.03***	0.07***
Relative deal size	0.27	18,452	0.21	4,736	0.23	2,822	0.18	1,914	0.29	13,716	-0.05***	0.08***
Diversify (DUM)	0.28	18,452	0.30	4,736	0.30	2,822	0.29	1,914	0.27	13,716	-0.01	-0.03***
High-tech (DUM)	0.21	18,452	0.08	4,736	0.09	2,822	0.07	1,914	0.25	13,716	-0.02***	0.17***
Public (DUM)	0.17	18,452	0.26	4,736	0.22	2,822	0.31	1,914	0.14	13,716	0.08***	-0.12***
Private (DUM)	0.52	18,452	0.36	4,736	0.39	2,822	0.32	1,914	0.57	13,716	-0.06***	0.21***
Subsidiary (DUM)	0.31	18,452	0.38	4,736	0.39	2,822	0.37	1,914	0.29	13,716	-0.02	-0.09***
Hostile deal (DUM)	0.00	18,452	0.00	4,736	0.00	2,822	0.00	1,914	0.00	13,716	-0.00	-0.00**
Tender offer (DUM)	0.02	18,452	0.04	4,736	0.04	2,822	0.05	1,914	0.02	13,716	0.02***	-0.03***
Competing deal (DUM)	0.01	18,452	0.01	4,736	0.01	2,822	0.02	1,914	0.01	13,716	0.01	-0.01***
Pure-cash deal (DUM)	0.27	18,452	0.34	4,736	0.35	2,822	0.33	1,914	0.25	13,716	-0.02	-0.09***
Pure-stock deal (DUM)	0.22	18,452	0.17	4,736	0.14	2,822	0.22	1,914	0.23	13,716	0.08***	0.06***

Table 3: Pension deficit and the likelihood of being an acquirer and acquisition expenses

This table shows the probit regression of the choice of acquirer and the OLS regression of the acquisition expenses from 1988 to 2007. The sample only includes completed U.S. mergers and acquisitions listed in SDC database. Model (2) and (5) assume that the pension deficit is zero if the firm is not a DB firm. Model (3) and (6) are using Heckman selection equation to address the sample selection bias (Refer to the selection equation in the appendix). Robust *t*-statistics based on standard errors adjusted for heteroskedasticity (White (1980)) are in parentheses. Coefficients that are significant at 10%, 5%, and 1% are marked with *, **, *** in superscripts, respectively. All regressions control for year fixed effects and standard errors are clustered by firm, whose coefficient estimates are suppressed. All dollar values are converted into 2000 constant dollars using the GDP deflator. Variable definitions are in Appendix B.

	Acquirer (1)	Acquirer (2)	Acquirer (3)	Acq_Exp (4)	Acq_Exp (5)	Acq_Exp (6)
Ln(Assets)	0.03*** (3.9)	0.07*** (15.5)	0.02 (1.5)	-0.00 (-1.2)	0.00*** (7.3)	-0.00*** (-4.2)
Ln(Firm age)	-0.06*** (-3.9)	-0.13*** (-14.3)	-0.06*** (-2.6)	-0.01*** (-7.1)	-0.01*** (-16.3)	-0.01*** (-7.1)
Tangibility	-0.71*** (-9.1)	-0.50*** (-12.3)	-0.70*** (-7.8)	-0.04*** (-10.2)	-0.03*** (-15.3)	-0.04*** (-11.4)
Cash/Assets	-0.39*** (-2.8)	-0.09** (-2.3)	-0.50*** (-3.1)	-0.00 (-0.1)	-0.02*** (-8.3)	0.00 (0.2)
CF/Assets	0.57* (1.9)	0.10*** (3.8)	0.55 (1.6)	0.06*** (5.8)	0.02*** (10.4)	0.08*** (6.8)
MB	-0.03** (-2.0)	-0.00 (-0.9)	-0.02 (-1.2)	0.00 (0.6)	0.00*** (3.4)	0.00** (2.2)
CF/Assets*MB	-0.04* (-1.9)	-0.01*** (-4.9)	-0.04 (-1.6)	-0.00*** (-3.3)	-0.00*** (-4.8)	-0.00*** (-4.4)
Sales growth	0.08*** (4.3)	0.04*** (8.5)	0.08*** (2.9)	0.01*** (2.8)	0.00*** (4.4)	0.01*** (4.9)
Price run-up1	0.14*** (6.5)	0.12*** (15.6)	0.13*** (5.5)	0.01*** (4.7)	0.01*** (13.3)	0.01*** (3.9)
Z-score	-0.05*** (-4.5)	-0.02*** (-6.1)	-0.04*** (-2.7)	-0.00** (-2.0)	-0.00** (-2.5)	-0.00** (-2.0)
ROA	1.14*** (3.8)	0.66*** (11.6)	0.93*** (2.7)	0.08*** (5.2)	0.02*** (6.6)	0.06*** (4.6)
Earnings volatility	-0.46 (-1.6)	0.16*** (6.1)	-0.11 (-0.3)	0.01 (0.6)	0.01*** (3.1)	0.04** (2.2)
Leverage	-0.25*** (-3.0)	-0.08* (-2.0)	-0.21** (-2.2)	-0.00 (-0.3)	0.00 (1.5)	-0.00 (-0.1)
Pension deficit/Assets	-0.72*** (-2.8)	-1.08*** (-4.2)	-0.76*** (-2.6)	-0.03* (-1.9)	-0.05*** (-3.8)	-0.03** (-2.2)
Non-DB dummy		0.05*** (2.6)			-0.00** (-2.4)	
Constant	-0.92*** (-9.4)	-1.16*** (-21.9)	-0.86*** (-4.9)	0.06*** (8.8)	0.04*** (15.2)	0.09*** (11.1)
Year FE	Y	Y	Y	Y	Y	Y
(Pseudo) R-square	0.03	0.04	NA	0.04	0.03	NA
N	25,362	90,037	62,850	25,362	90,037	62,850
Regression	Probit	Probit	Heckman	OLS	OLS	Heckman

Table 4: Pension deficit and the likelihood of making diversifying acquisition by bidders

This table shows the probit regression of the diversifying acquisition made by bidders from 1988 to 2007. The sample only includes completed U.S. mergers and acquisitions listed in SDC database. Models in the first three columns are conditional on the firm is an acquirer and models in the last three columns are unconditional and assume that the diversifying acquisition dummy is zero for non-acquirers. Model (2) and (5) assume that the pension deficit is zero if the firm is not a DB firm. Model (3) and (6) are using Heckman selection equation to address the sample selection bias (Refer to the selection equation in the appendix). Robust *t*-statistics based on standard errors adjusted for heteroskedasticity (White (1980)) are in parentheses. Coefficients that are significant at 10%, 5%, and 1% are marked with *, **, *** in superscripts, respectively. All regressions control for year fixed effects and standard errors are clustered by firm, whose coefficient estimates are suppressed. All dollar values are converted into 2000 constant dollars using the GDP deflator. Variable definitions are in Appendix B.

	Diversify (1)	Diversify (2)	Diversify (3)	Diversify (4)	Diversify (5)	Diversify (6)
Ln(Assets)	-0.02 (-0.9)	-0.05*** (-4.9)	-0.08*** (-2.8)	0.02** (2.5)	0.04*** (6.2)	-0.01 (-0.7)
Ln(Firm age)	0.09*** (2.7)	0.06*** (3.3)	0.00 (0.1)	-0.01 (-0.4)	-0.07*** (-6.0)	-0.05 (-1.6)
Tangibility	-0.91*** (-5.5)	-0.91*** (-11.1)	-0.98*** (-5.4)	-1.02*** (-10.3)	-0.86*** (-16.2)	-1.08*** (-9.4)
Cash/Assets	-0.28 (-1.0)	-0.46*** (-5.5)	-0.09 (-0.3)	-0.42** (-2.4)	-0.31*** (-5.8)	-0.43** (-2.2)
CF/Assets	0.61 (1.3)	0.04 (1.0)	0.83 (1.6)	0.38* (1.7)	0.07** (2.4)	0.51* (1.8)
MB	0.01 (0.1)	-0.03*** (-3.2)	0.02 (0.3)	-0.05** (-2.5)	-0.01*** (-2.9)	-0.05* (-2.0)
CF/Assets*MB	-0.43* (-1.9)	-0.01** (-2.4)	-0.49* (-1.8)	-0.02 (-1.6)	-0.01*** (-4.9)	-0.03* (-1.7)
Sales growth	0.06 (1.5)	0.02** (2.0)	0.13** (2.0)	0.08*** (4.1)	0.03*** (6.6)	0.07*** (2.8)
Price run-up1	0.02 (0.4)	0.03* (1.8)	0.01 (0.3)	0.13*** (4.6)	0.11*** (10.8)	0.12*** (3.9)
Z-score	-0.05** (-2.1)	-0.01 (-1.4)	-0.06 (-1.5)	-0.07*** (-5.7)	-0.02*** (-5.4)	-0.05*** (-3.2)
ROA	0.32 (0.6)	0.02 (0.2)	0.23 (0.4)	1.15*** (3.9)	0.54*** (8.0)	0.85** (2.3)
Earnings volatility	-0.23 (-0.4)	0.19*** (3.4)	0.28 (0.4)	-0.46 (-1.1)	0.21*** (6.3)	0.13 (0.2)
Leverage	-0.01 (-0.1)	0.10 (1.2)	-0.01 (-0.0)	-0.20* (-1.8)	-0.03 (-0.6)	-0.15 (-1.2)
Pension deficit/Assets	-1.02** (-2.0)	-0.87* (-1.8)	-1.13** (-2.1)	-0.98*** (-3.4)	-1.12*** (-3.9)	-1.11*** (-3.5)
Non-DB dummy		-0.28*** (-6.5)			-0.10*** (-3.9)	
Constant	-0.04 (-0.2)	0.32*** (2.6)	0.77** (2.0)	-1.38*** (-11.0)	-1.43*** (-20.8)	-0.88*** (-3.8)
Year FE	Y	Y	Y	Y	Y	Y
Pesudo R-square	0.02	0.03	NA	0.04	0.04	NA
N	2,803	10,562	7,457	25,362	90,037	62,850
Conditional (acquirer)	Y	Y	Y	N	N	N
Regression	Probit	Probit	Heckman	Probit	Probit	Heckman

Table 5: Announcement abnormal return

This table shows the distribution of announcement abnormal returns for completed U.S. mergers and acquisitions listed in SDC database from 1988 to 2007. In panel A, firms are partitioned into sponsors (pension deficit/surplus) and non-sponsors of DB plans. In Panel B, DB firms are classified into five groups based on the pension funding status each year. In both panels, *t*-statistics are reported for the difference of the mean values. All variables are winsorized at 0.5% and 99.5% of their distributions and *t*-statistics that are significant at 10%, 5%, and 1% are marked with *, **, *** in superscripts, respectively. Variable definitions are in Appendix B.

Panel A: Announcement abnormal return distribution

Variables	All firms	DB firms			Non-DB firms	Diff	Diff
	Mean (N=18,452) (1)	All Mean (N=4,736) (2)	Pension deficit Mean (N=2,822) (3)	Pension surplus Mean (N=1,914) (4)	Mean (N=13,716) (5)		
AR	0.81%	0.40%	0.66%	0.01%	0.95%	-0.65%***	0.56%***
CAR _(-1,1)	1.41%	0.80%	1.15%	0.29%	1.63%	-0.86%***	0.82%***
CAR _(-2,2)	1.50%	0.88%	1.25%	0.34%	1.72%	-0.88%***	0.84%***

Panel B: Differences in announcement abnormal returns of DB firms

Variables	DB firms					Diff
	Group 1 (N=957) (1)	Group 2 (N=943) (2)	Group 3 (N=942) (3)	Group 4 (N=943) (4)	Group 5 (N=951) (5)	
AR	-0.10%	0.23%	0.22%	0.72%	0.91%	1.01%***
CAR _(-1,1)	0.27%	0.49%	0.28%	1.23%	1.74%	1.48%***
CAR _(-2,2)	0.31%	0.52%	0.27%	1.50%	1.80%	1.49%***

Table 6: Portfolio returns and premium

This table shows the distribution of portfolio returns and premium for completed U.S. mergers and acquisitions listed in SDC database from 1988 to 2007. In panel A, firms are partitioned into sponsors (pension deficit/surplus) and non-sponsors of DB plans. In Panel B, DB firms are classified into five groups based on the pension funding status. In both panels, *t*-statistics are reported for the difference of the mean values. All variables are winsorized at 0.5% and 99.5% of their distributions and *t*-statistics that are significant at 10%, 5%, and 1% are marked with *, **, *** in superscripts, respectively. Variable definitions are in Appendix B.

Panel A: Distributions of portfolio returns and premium

Variables	All firms		DB firms			Non-DB firms	Diff (4)-(3)	Diff (5)-(2)
	Mean	All	Pension deficit	Pension surplus	Mean			
	(1)	(2)	(3)	(4)	(5)			
WCAR _(-1,1)	1.70%	1.84%	2.61%	1.08%	1.61%	-1.53%***	-0.23%	
N	2,138	873	436	437	1,265			
Premium	62.99%	60.61%	58.46%	62.74%	64.71%	4.28%*	4.10%**	
N	2,062	864	431	433	1,198			

Panel B: Differences in portfolio returns and premiums of DB firms

Variables	DB firms					Diff (5) - (1)
	Group 1	Group 2	Group 3	Group 4	Group 5	
	(1)	(2)	(3)	(4)	(5)	
WCAR _(-1,1)	1.62%	0.88%	0.71%	2.35%	3.64%	2.01%***
N	175	174	175	174	175	
Premium	74.98%	56.64%	51.23%	55.56%	64.57%	-10.41%***
N	173	173	172	173	173	

Table 7: Pension deficit, announcement returns and portfolio returns

This table shows the OLS regression of announcement returns and portfolio returns for acquiring firms. Model (1) includes 4,736 completed U.S. mergers and acquisitions made by 1,775 acquiring firms and Model (3) includes 873 completed U.S. mergers and acquisitions made by 564 acquiring firms from 1988 to 2008. Model (2) and (5) assume that the pension deficit is zero if the firm is not a DB firm and include 18,452 and 2,138 completed U.S. mergers and acquisitions made by 6,672 and 1,464 acquiring firms respectively. Model (3) and (6) are using Heckman selection equation to address the sample selection bias. Robust *t*-statistics based on standard errors adjusted for heteroskedasticity (White (1980)) are in parentheses. Coefficients that are significant at 10%, 5%, and 1% are marked with *, **, *** in superscripts, respectively. All regressions control for year fixed effects and standard errors are clustered by firm, whose coefficient estimates are suppressed. All dollar values are converted into 2000 constant dollars using the GDP deflator. Variable definitions are in Appendix B.

	CAR _(-1,1)	CAR _(-1,1)	CAR _(-1,1)	WCAR _(-1,1)	WCAR _(-1,1)	WCAR _(-1,1)
	(1)	(2)	(3)	(4)	(5)	(6)
Relative deal size	0.03*** (6.0)	0.02*** (10.0)	0.03*** (11.5)	0.03*** (3.5)	0.01*** (2.6)	0.02*** (2.9)
Diversify	-0.00 (-0.9)	0.00* (1.8)	-0.00 (-0.3)	-0.00 (-0.1)	-0.01* (-1.7)	0.00 (0.2)
High Tech	-0.00 (-0.5)	-0.00 (-1.5)	-0.00 (-1.2)	-0.00 (-0.3)	-0.00 (-1.1)	0.00 (0.2)
Public	-0.02*** (-7.5)	-0.03*** (-15.1)	-0.02*** (-7.3)	0.01 (0.5)	0.01 (0.7)	0.02 (0.6)
Private	-0.00** (-2.2)	-0.00* (-1.9)	-0.00** (-2.1)			
Hostile	0.02* (1.7)	-0.01 (-0.4)	0.02 (1.1)	0.05* (1.9)	0.05* (1.8)	0.04* (1.7)
Competed	-0.01 (-0.8)	0.02 (1.0)	-0.01 (-1.0)	-0.01 (-0.8)	-0.00 (-0.2)	-0.01 (-0.6)
All cash	0.00 (1.4)	0.00** (2.4)	0.00 (1.3)	0.02*** (2.7)	0.02*** (5.0)	0.02*** (2.8)
All Stock	-0.00 (-0.9)	0.00 (0.1)	-0.00 (-0.1)	-0.01*** (-3.0)	-0.02*** (-5.5)	-0.01* (-1.9)
Liquidity Index	-0.00 (-0.4)	-0.00* (-1.8)	0.00 (0.5)	0.01 (0.6)	-0.00 (-0.5)	0.01 (1.0)
Ln(Assets _{Acq})	-0.00*** (-5.2)	-0.00*** (-7.3)	-0.00** (-2.0)	-0.00** (-2.1)	-0.01*** (-3.0)	-0.01** (-2.5)
MB _{Acq}	0.00 (1.2)	-0.00 (-1.2)	0.00* (1.8)	0.00 (0.6)	-0.00** (-2.1)	0.00 (0.6)
(CF/Assets) _{Acq}	-0.02 (-1.6)	0.00 (0.5)	-0.02** (-2.0)	0.01 (0.2)	-0.01 (-0.6)	0.00 (0.1)
Price run-up _{2Acq}	-0.02*** (-5.7)	-0.01*** (-6.0)	-0.01*** (-6.4)	-0.01* (-2.0)	-0.01*** (-3.1)	-0.02*** (-2.7)
Leverage _{Acq}	0.01* (1.9)	0.00 (1.3)	0.01** (2.1)	0.01 (1.0)	0.02* (1.8)	0.00 (0.3)
Ln(Assets _{Tgt})				0.00* (1.7)	0.00 (1.4)	0.01*** (3.0)
MB _{Tgt}				0.00 (0.6)	-0.00* (-1.9)	0.00 (1.1)
(CF/Assets) _{Tgt}				0.01 (0.9)	0.01 (1.5)	0.01 (1.1)
Price run-up _{2Tgt}				-0.01* (-1.9)	-0.00 (-0.6)	-0.01** (-2.4)

Leverage _{Tgt}				-0.00 (-0.3)	-0.01 (-0.7)	0.00 (0.2)
(Pension deficit/Assets) _{Acq}	0.06*** (2.9)	0.07*** (3.5)	0.05** (2.3)	0.15** (2.2)	0.18*** (2.8)	0.14*** (2.6)
Non-DB dummy		-0.00 (-0.8)			-0.00 (-1.2)	
Constant	0.02*** (2.9)	0.03*** (4.6)	0.01 (1.2)	-0.01 (-0.3)	0.04** (2.1)	-0.03 (-0.7)
Year FE	Y	Y	Y	Y	Y	Y
R-square	0.10	0.05	NA	0.17	0.11	NA
N	4,736	18,452	13,176	873	2,138	1,599
Regression	OLS	OLS	Heckman	OLS	OLS	Heckman

Table 8: Pension deficit and premium paid by bidders

This table shows the OLS regression of premium paid by acquiring firms. Model (1) includes 864 completed U.S. mergers and acquisitions made by 536 acquiring firms from 1988 to 2008. Model (2) assumes that the pension deficit is zero if the firm is not a DB firm and includes 2,062 completed U.S. mergers and acquisitions made by 1,395 acquiring firms respectively. Model (3) is using Heckman selection equation to address the sample selection bias. Robust *t*-statistics based on standard errors adjusted for heteroskedasticity (White (1980)) are in parentheses. Coefficients that are significant at 10%, 5%, and 1% are marked with *, **, *** in superscripts, respectively. All regressions control for year fixed effects and standard errors are clustered by firm, whose coefficient estimates are suppressed. All dollar values are converted into 2000 constant dollars using the GDP deflator. Variable definitions are in Appendix B.

	Premium (1)	Premium (2)	Premium (3)
All cash	-0.10*** (-2.7)	-0.14*** (-5.6)	-0.10** (-2.5)
Toe hold		0.19** (2.3)	
Ln(Market cap) _{Acq}	0.01 (1.0)	0.04*** (4.7)	-0.00 (-0.2)
Ln(Market cap) _{Tgt}	-0.08*** (-5.7)	-0.08*** (-7.9)	-0.08*** (-5.5)
Tender offer	0.21*** (4.6)	0.18*** (5.8)	0.20*** (4.4)
Hostile	0.04 (0.3)	0.14 (1.4)	-0.09 (-0.5)
Diversify	-0.02 (-0.4)	-0.01 (-0.2)	-0.02 (-0.5)
Subsidiary	0.10 (0.7)	0.22 (1.1)	0.09 (0.4)
MB _{Acq}	0.03* (1.8)	0.02*** (3.2)	0.04* (1.8)
MB _{Tgt}	0.00 (0.3)	-0.01 (-1.5)	0.01 (0.4)
Competed	0.16* (1.9)	0.12** (2.2)	0.20*** (2.7)
Leverage _{Acq}	0.05 (0.5)	0.20*** (3.2)	0.11 (1.0)
(Pension deficit/Assets) _{Acq}	-0.81* (-1.9)	-0.69* (-1.7)	-0.70* (-1.7)
Non-DB dummy		0.04 (1.6)	
Constant	1.20*** (6.3)	0.83*** (6.6)	1.50*** (5.0)
Year FE	Y	Y	Y
R-square	0.16	0.11	NA
N	864	2,062	1,495
Regression	OLS	OLS	Heckman

Table 9: Pension deficit and percentage of cash payment

This table shows the OLS regression of percentage of cash payment by acquiring firms. Model (1) includes 514 completed U.S. mergers and acquisitions made by 406 acquiring firms from 1988 to 2008. Model (2) assumes that the pension deficit is zero if the firm is not a DB firm and includes 1,099 completed U.S. mergers and acquisitions made by 892 acquiring firms respectively. Model (3) is using Heckman selection equation to address the sample selection bias. Robust *t*-statistics based on standard errors adjusted for heteroskedasticity (White (1980)) are in parentheses. Coefficients that are significant at 10%, 5%, and 1% are marked with *, **, *** in superscripts, respectively. All regressions control for year fixed effects and standard errors are clustered by firm, whose coefficient estimates are suppressed. All dollar values are converted into 2000 constant dollars using the GDP deflator. Variable definitions are in Appendix B.

	% of cash (1)	% of cash (2)	% of cash (3)
Relative target size	-0.05*** (-4.1)	-0.05*** (-6.6)	-0.04*** (-3.5)
Ln(MV of assets) _{Acq}	-0.02** (-2.4)	-0.01* (-1.8)	-0.03** (-2.3)
Cash/Assets	0.47*** (3.5)	0.05 (0.7)	0.56*** (4.0)
Tender offer	0.17*** (6.1)	0.21*** (11.2)	0.17*** (5.4)
Hostile	-0.08 (-1.1)	-0.01 (-0.2)	-0.09 (-0.9)
Diversify	0.10*** (3.9)	0.05*** (2.6)	0.10*** (3.1)
Subsidiary	-0.11 (-1.1)	-0.13 (-1.3)	-0.10 (-0.4)
Competed	0.04 (0.9)	0.04 (1.2)	0.01 (0.2)
MB _{Acq}	0.03 (1.4)	-0.01 (-1.3)	0.04* (1.8)
MB _{Tgt}	0.01 (0.9)	0.01 (1.0)	0.01 (0.7)
Leverage _{Acq}	-0.07 (-0.9)	-0.16*** (-2.8)	-0.26*** (-2.7)
(Pension deficit/Assets) _{Acq}	0.70** (2.3)	0.80*** (2.6)	0.53* (1.7)
Non-DB dummy		-0.03 (-1.2)	
Constant	0.48*** (3.4)	0.67*** (6.7)	0.93*** (6.0)
Year FE	Y	Y	Y
R-square	0.29	0.21	NA
N	514	1,099	825
Regression	OLS	OLS	Heckman

Appendix A: Selection equation

This table shows the selection equation of the DB plan from 1988 to 2007, which is used in the Heckman selection framework to address the sample selection bias. *t*-statistics are reported in parentheses. Coefficients that are significant at 10%, 5%, and 1% are marked with *, **, *** in superscripts, respectively. All regressions control for industry and year fixed effects following Shivdasani and Stefanescu (2009). All dollar values are converted into 2000 constant dollars using the GDP deflator. Variable definitions are in the appendix.

	DB dummy (1)
Ln(Assets)	0.36*** (74.3)
Ln(Firm age)	0.33*** (41.5)
ROA	0.34*** (5.4)
MB	-0.05*** (-8.8)
Leverage	0.20*** (5.6)
Tax rate	0.05*** (2.8)
No. of employees	-0.00*** (-13.7)
Employee tenure	0.02*** (4.8)
Unionization	0.01*** (8.3)
Earnings volatility	-1.62*** (-16.4)
Constant	-3.27*** (-50.7)
Year FE	Y
Industry FE	Y
Pseudo R-square	0.40
N	62,850
Regression	Probit

Appendix B: Variable definitions

Variable	Definition
<i>Panel A: Main explanatory variables</i>	
Pension deficit	Projected benefit obligation (PBO) - pension plan assets (PPA), equal to (-1)*pension funding status. PBO and PPA are Compustat items.
DB dummy	Dummy variable: 1 if the firm reports either non-zero pension assets or non-zero pension liabilities, 0 otherwise.
Non-DB dummy	1-DB dummy.
<i>Panel B: Main dependent variables</i>	
Acquirer	Dummy variable: 1 for firms that are making any M&A transaction in a fiscal year, 0 otherwise.
Acq_Exp	Compustat item: acquisition expenses is defined as cash outflow of funds used for and/or the costs relating to acquisition of a company in a year or effects of an acquisition in a prior year carried over to the current year.
Diversify	Dummy variable: 1 if bidder and target do not share a 12 Fama-French industry, 0 otherwise.
CAR _(-1,+1)	Three-day cumulative abnormal return calculated using the market model. The market model parameters are estimated using the return data for the period (-205,-6).
WCAR _(-1,+1)	Value-weighted average of target and bidder CAR _(-1,+1) based on their market capitalization two days prior to the announcement.
Premium	Deal value/target market capitalization at 50 days prior to announcement. Deal value is disclosed is a SDC item.
% of cash	SDC item: value paid in cash divided by total value.
<i>Panel C: Firm characteristics</i>	
Assets	Compustat item: book value of total assets.
Market cap	Market capitalization is defined as number of shares outstanding multiplied by the stock price at 50 days prior to announcement.
MB	Market-to-book ratio is defined as market capitalization + book value of total assets - common/ordinary equity, scaled by book value of total assets.
Firm age	Number of years a firm has been listed on CRSP.
ROA	EBIT over book value of total assets.
Leverage	Book value of long-term debt+ book value of debt in current liabilities over book value of total assets.
Cash	Compustat item: cash and short-term investments.
CF	Cash flow is defined as depreciation + amortization + income before extraordinary items, scaled by book value of total assets.
Price run-up1	Buy-and-hold return up to fiscal year end.
Price run-up2	Buy-and-hold abnormal return (market adjusted) during the period (-205, -6). The market index is the CRSP value-weighted return.
Tangibility	PPE (net) scaled by book value of total assets. PPE is a Compustat item.
Earnings volatility	Standard deviation of EBIT during the past five years.
No. of employees	Compustat item: number of employees includes all part-time and seasonal employees and all employees of consolidated subsidiaries.
Employee tenure	Median years of tenure with current employer for employed wage and salary workers at industry level from the CPS maintained by BLS.
Unionization rate	Median union coverage at industry level from the Unionstats database maintained by Hirsch and Macpherson, which is summarized from the CPS of BLS
Z-score	Altman's z-score, which is defined as 3.3*EBIT + sales + 1.4*retained earnings + 1.2*(current assets - current liabilities, scaled by

	total assets
Sales growth	Sales in prior year/sales in current year -1. Sales are a Compustat item.
Tax rate	Effective tax rate is defined as income taxes/pretax income. Income taxes and pretax income are Compustat items.
GIM index	Based on 24 anti-takeover provisions. Higher index levels correspond to more managerial power.
BCF index	Based on 6 anti-takeover provisions. Higher index levels correspond to more managerial power.
Classified board	Dummy variable: 1 if the bidder has a staggered board, 0 otherwise.
<i>Panel D: Deal characteristics</i>	
Toehold	Dummy variable: 1 if the acquirer holds at least 5 percent of the target shares, 0 otherwise.
Public	Dummy variable: 1 for public targets, 0 otherwise.
Private	Dummy variable: 1 for private targets, 0 otherwise.
Subsidiary	Dummy variable: 1 for subsidiary targets, 0 otherwise.
All cash	Dummy variable: 1 for purely cash-financed deals, 0 otherwise.
All stock	Dummy variable: 1 for pure stock-financed deals, 0 otherwise.
Hostile	Dummy variable: 1 if the attitude of the transaction is hostile, 0 otherwise.
Competed	Dummy variable: 1 if a third party launched an offer for the target while this original bid was pending.
Tender offer	Dummy variable: 1 if a tender offer is launched for the target.
Diversify	Dummy variable: 1 if bidder and target do not share a 12 Fama-French industry, 0 otherwise.
High-tech	Dummy variable: 1 if bidder and target are both from the high-tech industries defined by Loughran and Ritter (2004), 0 otherwise.
Relative deal size	Deal value (from SDC) over bidder's market capitalization, which is defined as number of shares outstanding multiplied by the stock price at prior fiscal year end.
Relative target size	Natural logarithm of market capitalization of target over market capitalization of acquirer at 50 days prior to the announcement.
MV of assets	Book value of total assets + market capitalization - book value of common equity. Book value of common equity is a Compustat item.
Liquidity index	The value of all deals reported by SDC for each prior year and 12 Fama-French industry divided by the total book value of assets of all Compustat firms in the same Fama-French industry and year.
