Defined-Benefit Pension Plans and Investment Choices: The Role of Employees' Bargaining Power

Meryem Duygun
Business School
University of Hull
M.Duygun@hull.ac.uk
(+44) 0 1482 463244

Bihong Huang
Faculty of Business Administration
University of Macau
Macau SAR
bhhuang@umac.mo
(+853)8822-4668

Xiaolin Qian
Faculty of Business Administration
University of Macau
Macau SAR
xiaolinqian@umac.mo
(+853) 8822-4750

Lewis H.K. Tam*
Faculty of Business Administration
University of Macau
Macau SAR
lewistam@umac.mo
(+853) 8822-8870

This version: Dec 29, 2015

Defined-Benefit Pension Plans and Investment Choices: The Role of Employees' Bargaining Power

Abstract

This paper investigates the impacts of defined benefit (DB) pension plans on the corporate investment choices between capital expenditure and various forms of acquisition. We find that a firm's DB plan coverage is negatively associated with its propensity of making a major investment. Conditional on a major investment decision, however, a firm with higher DB plan coverage is more likely to acquire firms abroad or in other industries rather than invest in fixed assets or engage in domestic and horizontal acquisitions. Our explanation is that he employees' bargaining powers reflected by DB plan coverage induce the firms to respond strategically by changing their investment decisions so as to raise their positions on the employees' bargaining table.

I. Introduction

A growing amount of research studies how the corporate-sponsored defined-benefit (DB hereafter) pension plans affect corporate financial decisions. Among others, Rauh (2006) argues and shows that the mandatory contribution to DB pension funds results in lower investment in fixed assets. Chang, Kang and Zhang (2012) examine the disciplinary role of DB pension plan deficits in mergers and acquisitions and conclude that firms with more deficits are more likely to engage in value-enhancing mergers. Cocco and Volpin (2013) find that firms sponsoring DB pension plans are less likely to be a takeover target while the acquirer firms with DB pension plans are more likely to pay in cash than their counterparts without such plans. The above studies, however, mainly focus on how DB plans affect a particular type of investment.

Our paper contributes to the literature by demonstrating that DB pension plans affect the choices between capital expenditure and various forms of acquisition. Specifically, utilizing information gleaned from US IRS 5500 filings that cover all US pension plans with at least 100 participants, we construct a novel measure of firm-level DB plan coverage, defined as the ratio of DB pension plan assets to total pension assets. The empirical evidences derived from a sample of US manufacturing firms indicate that a firm's DB plan coverage is negatively associated with its propensity of making a major investment. Conditional on a major investment decision, however, the firm with higher DB plan coverage is more likely to acquire firms abroad or in other industries rather than invest in fixed assets or engage in domestic and horizontal acquisitions.

These findings are consistent with the bargaining powers reflected by DB plan coverage which is highly correlated with employees' accessibility to DB pension plans. The corporate-sponsored DB plans are usually achieved via the employees' collective bargaining with their employers. In addition, most of them were set up in the time when labor unions were strong to protect employees' post-retirement living standards. A survey by Bureau of Labor Statistics

(BLS) published in 2013 shows that unionized workers enjoy better retirement benefits than the non-unionized workers. The former group is much more likely to own corporate-sponsored pension plans (86% versus 45%), and be covered by the DB plans (68% versus 11%) under which the employees' pension benefits are guaranteed by a given formula. In contrast, for the defined contribution (DC) plans under which the employees' pension benefits fluctuate with the investment performance of pension funds, the participation rates of the two groups of workers are very close (44% versus 42%).[1] When more and more firms have been shifting to DC plans due to the cost disadvantages of DB plans, the percentage of frozen DB plans is also much higher for non-unionized workers than their unionized counterparts (33% versus 15%). Indeed, quite a few of strikes nowadays are caused by employers' attempt to freeze old DB plans while offer DC plans to new employees.[2] Keeping DB plans intact, at least for the existing employees, is one of the major territories labor unions are defending. Therefore, the existence of DB plans and its extent should indicate the employees' bargaining power in a firm.

Facing strong employees' bargaining power, the firms would respond strategically by changing their investment decisions. When the employment contract is complete, a firm would choose a level of investment that maximizes its value by balancing all external factors. However, previous studies and anecdotal evidence widely suggest that employees have strong incentives to fight for a better compensation through a threat of labor actions, especially in good states of firm performance. Baldwin (1983) and Grout (1984) theoretically demonstrate that the renegotiation risk causes firms to under-invest in face of strong labor bargaining power. However, the firms can improve their bargaining position against the employees by moving

[1] See "National Compensation Survey: Employee Benefits in the United States, March 2013" by Bureau of Labor Statistics.

[2] There are generally two types of pension plan freeze. A "hard" freeze eliminates the accrual of new benefits for all employees, while a "soft" freeze excludes some classes of employees, usually new employees, from the accrual of benefits under the old plan.

their investments towards overseas plants, or carrying out international or vertical acquisitions.[3] The international oligopoly model by Lommerud, Staume and Sorgard (2006) shows that a cross-border acquisition triggers increased competition between labor unions for job security and firm's commitment on future investments because the firm can exploit the potential of shifting inputs and production between plants in different countries. Such union rivalry consequently leads to workers' concession on wage, which has been an important determinant of a firm's decision to invest abroad. Besides, it is more difficult for unions in different locations to cooperate than unions in the same location. This reality further weakens the employees' bargaining power. The equilibrium market structure implies that a cross-border acquisition is an effective corporate strategy to reduce union rents. Lommerud, Meland and Sorgard (2003), and Eckel and Egger (2009) predict that investing and producing abroad can increase a firm's bargaining power by allowing it to continue its operations even in the case of disagreement with local workers. The theoretical model developed by Rose (1991) also implies that diversification can improve a firm's ability to take strike and reduce wage settlements. It can be expected that diversifying acquisitions would have a similar effect on employees' bargaining power as cross-border acquisitions. As labor unions exist to protect workers with similar working conditions and interests, it is difficult for labor unions representing workers in different industries to collude with each other.

This study empirically test the above theoretical implications. Examining a sample of 27,883 US manufacturing firm-years in 1990-2003, we find that DB plan coverage is negatively associated with the propensity of a major investment defined as a large capital expenditure or an acquisition of firms. In terms of the economic magnitude, a one-standard-deviation increase in DB plan coverage is associated with a reduction of 0.062 in odds ratio for acquisition and

[3] Alternatively, firms can strategically reduce the financial resources on the bargaining table by adopting a tightened financial policy to increase their bargaining power. See Perotti and Spier (1993), Klasa, Maxwell, Molina (2009), and Matsa (2010) for examples and detailed discussions.

0.244 in odds ratio for large capital expenditure. Conditional on a major investment decision, a firm with higher DB plan coverage is more likely to acquire rather than to invest in fixed assets. A one-standard-deviation increase in DB-plan coverage is associated with an increase of 0.217 in odds ratio of acquisition versus capital expenditure. Among acquisitions, a firm with high DB plan coverage prefers cross-border or diversifying acquisitions to domestic horizontal acquisitions. A one-standard-deviation increase in DB plan coverage is associated with an increase of 0.184 in odds ratio of cross-border or diversifying acquisition versus domestic horizontal acquisition.

Although the above findings are consistent with the bargaining power embedded in DB plans, they may arise due to the financial risk of DB plans. Firms offering DB plans are not free from their liabilities after making their contributions to designated pension pools because the deficits or surpluses of pension plans are closely related with investment risks resulting from the financial market fluctuations. Besides, the size of deficit is difficult to determine since it depends on the pension plan liabilities, pension plan members' longevity, and employee mobility, among others. Cocco and Volpin (2013) show that firms sponsoring DB plans are less likely to be a takeover target. Moreover, these firms are more likely to use cash rather than stock when acquiring other firms. The explanation they propose is that the uncertainty in the value of DB plan liabilities expose the merger counterparty to additional risk and information asymmetry. Other studies indicate that firms with higher pension liabilities have lower debt ratios (Shivdasani and Stefanescu, 2010), and invest sensitively to their mandatory contributions to DB pension plans (Rauh, 2006). If the presence of DB plans represents a source of financial risks for the sponsoring firms, engaging in product-market or geographical diversification should be a natural corporate strategy to reduce such risk exposure.[4]

[4] A counter argument for the financial risk effects of DB plans on corporate investment choice is that firms with higher DB plan coverage should be less likely to engage in cross-border or diversifying acquisitions because their managers would have weaker controls over the new investment due to the differences in legal environments and institutional settings or lack of expertise.

To examine whether our results are driven by the bargaining power or financial risks of DB plans, we estimate the changes in per capita pension expense and operating performance around major investment.[5] If DB plan only reflect the financial risks, cross-border or diversifying acquisitions by firms with higher DB plan coverage would not result in any significant changes in pension expense or operating performance. On the other hand, if DB plan represents employees' bargaining power, cross-border or diversifying acquisitions by firms with higher DB plan coverage should trigger a larger reduction in pension expense and therefore better operating performance. Our empirical tests show that cross-border or diversifying acquisitions create more value for firms with higher DB plan coverage, because such acquisitions are associated with lower pension expense but higher operating profitability. In contrast, large capital expenditures create less value for firms with higher DB plan coverage than their counterparts with low DB plan coverage. Firm may hence invest strategically to reduce pension expense. All our results imply that the bargaining power embedded in DB plans plays an important role in shaping corporate investment choices.

In evaluating the effects of DB plan coverage on corporate investment choices, there are a couple of methodological challenges that need to be addressed. First, sponsoring a DB pension plan is not random and some unobservable factors may determine the investment choices and firm characteristics simultaneously. Besides, reverse causation wherein the investment choices induce the change of DB plan coverage rather than the other way around, might be the other potential source of endogeneity. For example, Cocco and Volpin (2013) argue that the uncertainty in the value of DB plan liabilities expose the potential acquirers to additional risk and information asymmetry. Foreseeing the possibility of future acquisitions, a

[5] We examine change in per capita pension expense instead of change in per capita wage because wage information is missing for more than 80% of firms in Compustat. As employee's pension expense is a function of wage (together with tenure and age), the change in pension expense should reflect the change in overall compensation. Besides, change in pension expense is much less affected by firm-specific factors such as firm age and employees' average tenure than the level of pension expense.

firm may convert its DB pension plans into DC pension plans in order to reduce the hurdle of acquisitions. To address these methodological challenges, we instrument DB plan coverage with industry unionization rate and firm age that are exogenous to firm's investment and financial decisions. In addition, we employ the endogenous treatment effect model to account for the self-selection bias. Our results are qualitatively unchanged after controlling for these endogeneity concerns.

Second, previous studies show that cross-border merger activity is driven by country-level factors such as accounting standards, corporate governance, and investor protection (Rossi and Volpin, 2004; Martynova and Renneboog, 2008), taxation (Scholes and Wolfson, 1990; Huizinga and Voget, 2009), culture (Ahern, Daminelli and Fracassi, 2015), as well as geographical distance, quality of accounting disclosure, and bilateral trade (Erel, Liao and Weisbach, 2014). As our study assesses the investment decisions of US firms only, we cannot include those country-level factors in our analysis. Instead, we include industry-level proxies for some of those factors in our baseline models. Our main results are qualitatively unchanged for adding those additional controls.

Our study contributes to the literature in several ways. First, although there have been theoretical studies for the impact of employees' bargaining power on corporate investment choice, empirical studies are scant, as also evidenced by Clougherty et al. (pp.451). We empirically assess the theoretical implications of previous studies (Rose, 1991; Lommerud, Straume and Sorgard, 2003, 2006; Eckel and Egger, 2009) which indicates that diversification or investing abroad can increase a firm's bargaining position against its employees. Consistent with and furthering the theoretical predictions, we find that the presence of stronger labor bargaining power induces more cross-border rather than domestic acquisitions, and more diversifying rather than horizontal acquisitions. The estimation on the post-investment changes

in pension expense and operating performance also suggest that firms invest strategically to increase their bargaining power against their employees.

Second, our study provides additional insights to related empirical studies. Compared with Hirsch (1992) and Bronars and Deere (1993), we show that employees' bargaining power not only affects the level of capital expenditure, but also the choice between capital expenditure and acquisitions, as well as the decision to engage in a cross-border or diversifying acquisition. Compared with Rose (1991) who examines the impact of diversifying mergers on wage for a sample of 15 firms, we examine the impacts of different types of major corporate investments on employees' benefits and operating performance for a much larger sample of firms, with control for endogeneity in the investment choice. Our study also enriches the empirical study of Clougherty et al. (2014). Clougherty et al. theoretically and empirically show that cross-border mergers by other firms in industry create a downward pressure on the wages of domestic firms there, especially in a highly unionized industry. Whereas our study provides more direct tests on how firms respond to employees' bargaining power within firm. By linking different forms of investment to their financial impacts, we show that cross-border mergers by firms facing stronger employees' bargaining power also results in lower employees' benefits and better operating performance, while large capital expenditures have an opposite effect.

Third, our study also sheds new light to the growing empirical literature of cross-border merger activity. Previous studies find that on the demand side, the cross-border merger volumes between countries are driven by country factors such as accounting standards, corporate governance, and investor protection (Rossi and Volpin, 2004; Martynova and Renneboog, 2008), taxation (Scholes and Wolfson, 1990; Huizinga and Voget, 2009), culture (Ahern, Daminelli and Fracassi, 2015), as well as geographical distance, quality of accounting disclosure, and bilateral trade (Erel, Liao and Weisbach, 2014). On the benefit side, cross-border mergers create value by binding targets from countries with lower standards in corporate

governance and investor protection to the higher standards of bidders' countries (Bris, Brisley and Cabolis, 2008; Bris and Cabolis, 2008), governing targets by foreign institutional investors (Ferreira, Massa and Matos, 2010), disciplining poorly performing CEOs in countries with weak investor protection (Lel and Miller, 2015). Our study bridges up the demand side and the benefit side of cross-border M&As and we show that some cross-border mergers are driven by firms' motivations to reduce labor bargaining power through shifting assets abroad or to other industries.

Fourth, we construct a novel proxy to measure the firm-level employees' bargaining power. The existing studies rely either on survey on unionization for a small sample of firms (e.g. Hirsch, 1992; Matsa, 2010), industry-level unionization rate (e.g. Bronars and Deere, 1993; Klasa, Maxwell, and Ortiz-Molina, 2009; Shivdasani and Stefanescu, 2010; Clougherty et al., 2014), or the event of union formation (Tian and Wang, 2014), to gauge the employees' bargaining power. Our firm-specific measurement of DB-plan coverage allows us to investigate the effect of employees' bargaining power on corporate investment choice with a large-scale firm level data. In addition, our results are robust after controlling for the potential endogeneity between DB-plan coverage and corporate decisions. Besides, as opposed to most previous studies on DB pension plans (e.g. Shivdasani and Stefanescu, 2010; Chang, Kang and Zhang, 2012; Cocco and Volpin, 2013), our DB plan coverage accounts for not only the existence but also the extent of DB pension plans relative to DC pension plans, which allows us to compare among firms offering different levels of DB pension plans to employees.

The reminder of this paper proceeds as follows. Section 2 provides institutional background and reviews prior works. Section 3 describes data and construction of key variables. Section 4 presents the empirical results. Section 5 relates our studies to other studies for cross-border M&As. Finally, Section 6 concludes.

2. Institutional Background and Literature Review

Firms generally offer two types of pension plans to their employees, namely defined-benefit (DB) plans and defined-contribution (DC) plans. The main difference between DB and DC plans is that the firms with DB plans promise an employee fixed benefit after the retirement as defined by a fixed formula, which is usually a function of the employee's tenure, wage (usually in the final year), and sometimes age, while the firms with DC plans provide fixed annual contributions to a pension fund. In recent years, there is an increasing trend for US companies to switch from DB to DC pension plans or freeze the existing DB plans and shut out new hires. The share of DB plan assets has dropped from 65% in 1995 to 40% in 2005 (Broadbent, Palumbo and Woodman 2006). From the employer's perspective, DC plans are less costly to be maintained than DB plans. A direct benefit of freezing DB plans is that the pension liability is immediately reduced by the amount of expected future benefits, which significantly improves funding status of plans and the bottom line (Comprix and Muller, 2011). Rauh, Stefanescu and Zeldes (2013) find that firms save 2.7-3.6% of payroll per year by shifting DB to DC plans over a ten-year horizon. Moreover, shifting to DC plans reduce firms' uncertainty for their future contributions to DB plans which are affected by asset expected rate of return and the market interest rates.

2.1 DB plan and employees' bargaining power

DB plan reflectss employees' bargaining power for three reasons. First, compared with a DC plan, an employee's pension benefit under a typical DB plan is "back-loaded" and is mostly predetermined by a formula based on his (her) earnings before retirement (Kapinos 2009). As a result, employees in DB plans face a higher cost of job change and their values of outside options are lower. They are more concerned for and more loyal towards their employers' long term prospective than employees in DC plans. Employees covered by DB plan are hence

expected to have strong incentives to stay and bargain collectively with their employers when their benefits are threatened, while employees under DC plan are more likely to consider outside options and leave if they are not satisfied with the pension benefits offered by the employers.

Second, many corporate-sponsored DB plans are reached through collective bargaining and most of them were set up in early years when labor unions were strong to protect the employees' post-retirement benefits. Although labor union power is declining and there is a growing trend of moving towards DC plans, unionized workers still have a much higher participation rate in DB plans than non-unionized workers.

Third, DB plan coverage weakens the incentive of employees under different pension plans to cooperate to bargain with the employers. In shifting away from DB plans, most employers keep the pension benefits of existing employees unchanged and exclude new hires from DB pension plans so as to reduce the resistance from current workers and labor unions. This strategy would reduce the alignment between new and existing employees, and hurt employees' bargaining power and collective forces. For example, Bob Woods, spokesperson of International Association of Machinists and Aerospace Workers (IAM), told to In These Times during the strike against Lockheed Martin in April 2012:

> *The first time..., they take away pension for new hires. Next time around, when new hires [are in the union], they say 'we are going to freeze the pension.' Of course, the new hires that don't have a pension aren't going to strike, so then the pension is frozen, ... Companies like Lockheed Martin simply want to eliminate defined benefit pensions plans.*

Besides, the partial-shifting strategy may create "envy effect" among employees under different pension plans. Goel and Thakor (2005) demonstrate that an agent's utility increases with what she/he has and decreases with what others have due to social status (Frank, 1984) or equity consideration (Akerlof and Yellen, 1990). Envious workers may even spend effort to

sabotage others' works (Lazear, 1989). Goel and Thakor (2005) also argue that people are jealous of those who are close and comparable to them. In a workplace, workers always compare their compensation packages with others doing the same tasks. As DB plans generally offer higher and more stable post-retirement benefits than DC plans, it is likely that employees under DC plans will be envious of their colleagues under DB plans.

The cross-border or diversifying acquisitions are less likely to induce the "envy effect" than domestically horizontal acquisitions because the acquired overseas businesses are remotely comparable to the original one. Therefore, even a firm with high DB plan coverage may have identified a potential target with low DB-plan coverage in the same industry, it may have to consider the additional costs and problems to line up the compensation packages of employees from different original firms.

2.2 DB plan and financial risk

In offering a DB pension plan, a sponsoring firm is not free from financial liability after making its contributions to the plan. The value of DB plan asset is volatile and depends on quite a few of factors including a pension fund's asset allocation, risk management and investment performance, as well as the pension plan participant's longevity and employee mobility. When the market value of pension asset is less than the pension liability, the pension plan is in deficit. In this case, the sponsoring firms are required to make up the difference. Rauh (2006) indicates that the mandatory contribution to DB pension plans changes a firm's internal financial resources and reduces its capital expenditures. Bakke and Whited (2012), however, argue that Rauh's finding is driven by the sample of heavily underfunded firms. Besides of the mandatory contribution, the pension deficit is a liability to the firm. Shivdasani and Stefanescu (2010) find firms' debt ratios are about 35% higher when the pension assets and liabilities are considered. All of these contributes to the uncertainty of the firms' internal financial resources. In addition,

Cocco and Volpin (2013) argue that DB pension plans increase firms' information asymmetry and therefore act as a takeover deterrent when the potential acquirers are worried about the lemon problem. Therefore, DB plan is costly to maintain and the uncertainty in the pension fund investment increases firm's financial risk.

3. Data Sample, Construction of Variables and Empirical Strategy

3.1 Data sample

Our sample covers the manufacturing firms (SIC 2000-3999) in CRSP/Compustat Merged Database and IRS 5500 filings compiled by Center for Retirement Research at Boston College from 1990 to 2007. We extend the data to 2013 by downloading the IRS 5500 filings from Department of Labor. We join records from CRSP/Compustat and IRS filings using Employer Identification Number (EIN), the only identifier available in both databases. We include only manufacturing firms where labor union activities tend to be more intensive. In addition, DB pension plans are more prevalent in labor-intensive manufacturing industries than in hi-tech or service industries. We exclude firms with missing values for the regressions on investment choice. Our final sample consists of 27,883 firm-years.

IRS 5500 filings cover both DB and DC pension plans with at least 100 participants. Employers are required to file a separate form for each of their plans. Information recorded contains type and status of plan, summary statistics of participants, plan assets and liabilities, etc. In addition, employers are required to file Actuarial Information (Schedule B) for each DB plan, including in particular the estimation of projected benefit liabilities and funding status of the plan. In our study, we aggregate plan-level data to firm-level.[6]

[6] A limitation of using IRS 5500 filings is that the sponsoring entity of a plan could be a controlled subsidiary rather than the parent company, which creates a problem of consolidating all pension plan data to the parent level (Shivdasani and Stefanescu 2010). However, since there is no theoretical reasons why parents offer significantly more or less DB pension than their subsidiaries, the failure to account for subsidiaries' pensions should add noise rather than bias to our findings.

3.2 DB-plan coverage

The main explanatory variable of this study is DB plan coverage (*DB_Cover*), defined as the value of DB plan assets over the total assets of both DB and DC plans available on IRS 5500 filings. Since DB plan is usually maintained only for senior employees while new hires are excluded from it, an implicit assumption of this measurement is that more weights are given to more senior employees who tend to have higher values in their pension accounts. This is consistent with our assumption that DB plan coverage reflects employees' bargaining power because senior employees are more likely to occupy higher occupational ranks and therefore be more influential.

There are two potential biases of this measure of DB plan coverage. First, the value of pension assets fluctuates with market conditions which are unrelated to employees' bargaining power. To check the robustness of our findings, we use the number of employees covered by the DB-plan as an alternative measurement of employee's bargaining power and the results are qualitatively unchanged[7]. Second, Compustat provides consolidated financial information on parent level, while IRS 5500 filings can be made by group subsidiaries rather than the parents. Since the filings do not provide any information about the parent company of the filer, we cannot consolidate all pension plan data to the parent level. Therefore, our calculated pension assets may underestimate the actual pension assets for a company with subsidiaries. However, the missing information should add noise rather than systematic bias to our measure of DB plan coverage because the DB plan assets are scaled by total pension assets rather than total firm assets.

3.3 Major investment decision

[7] We do not report the results due to the space constraint, but they are available upon request.

We constructed two indicators to gauge major investment decision in a year. The first one is the major capital expenditure decision, *LargeCAPX*, which equals one if a firm's capital expenditure scaled by lagged one-period total assets is above 90th percentile for all sample firms in the year. In a robustness check, we use 75th percentile as a cutoff and the results are qualitatively the same. The second one is major mergers and acquisitions, *Acquire*, which equals one if a firm acquires at least one firm in the year. Specifically, we collect from Thomson One all mergers and acquisition transactions that are indicated as "Mergers". We exclude acquisitions of minority interests or acquisitions of remaining interests because they do not involve a change in control. We also exclude acquisitions of assets because those deals tend to be small.[8]

For acquirers in a year, we further check if they acquire foreign firms or firms in other industries, and define three types of mergers: (1) *CrossBorder* which equals one if a firm acquires at least one firm out of the United States in the year; (2) *Diversify* which equals one if a firm acquires at least one firm belonging to a different 4-digit SIC code; and (3) *CrossBorder-Diversify* which equals one if either *CrossBorder* or *Diversify* equals one.

3.4 Empirical strategy and explanatory variables

To examine the choice of major investment, we use logit model for binary choices and multinomial logit model for multiple (> 2) choices. To be specific, for each firm k that faces N+1 alternatives in year t, the utility of choice j in year t+1 is defined as follows:

$$u_{kjt+1} = w'_{kt}\beta_j + \varepsilon_{kjt+1},\ j = 0, 1,\ldots, N,$$

[8] Our definition of *Acquire* does not distinguish large M&As from small M&As because Thomson One does not report deal values for a significant percentage of M&A transactions. From our initial collection of all M&As in 1970-2014, about 54% of mergers report deal values, while only about 32% of asset acquisitions report deal values.

where w_{kt} is a set of firm-specific and industry-specific variables of interest in year *t*. Given this utility function, each firm chooses the investment type that maximizes its utility. The probability that firm k choose j^{th} choice is modelled as,

$$Prob(Y_{kt+1} = j|w_{kt}) = P_{kjt+1} = \frac{\exp(w'_{kt}\beta_j)}{\sum_{j=0}^{N}\exp(w'_{kt}\beta_j)}.$$

The model implies that we can compute the log-odds ratio of two alternative, *j* and *h*, as:

$$ln\left(\frac{P_{kjt+1}}{P_{kht+1}}\right) = w'_{kt}(\beta_j - \beta_h).$$

Suppose *h* is the base case. Conventionally, we normalize the base case by setting β_h to zero (pp. 844, Greene, 2008), so that we can identify the effect of firm-specific variables on the odds ratio by observing β_j.

We include the following firm-specific variables for the investment-choice models:

1. *DB_Cover*, the key explanatory variable of interest;
2. *CashFlow*, the sum of net income and depreciation minus dividends, divided by lagged total assets;
3. *Q*, the market-to-book ratio of assets;
4. *Size*, the natural logarithm of total assets in 2005 constant value;
5. *Tang*, net property, plant and equipment scaled by total assets;
6. *WC*, net working capital less cash, divided by total assets;
7. *Div*, cash dividend divided by lagged total assets;
8. *CumRet*, the 12-month cumulative stock return in fiscal year *t*.

All variables are one-period lagged the choice variables and they are winsorized at 1st and 99th percentiles of respective distributions. Besides, year dummies ($Yrdum$) are included to control for all firm-invariant variables and adjusted for the trends like nationwide legislation or policy

changes. The dummies for 2-digit SIC industries ($SIC2$) are added to control for all unobserved factors that are time-invariant and peculiar to each industry.

To address the endogeneity concern that might arise from the unobservable factors affecting the DB plan coverage and investment decisions simultaneously, we follow Shivdasani and Stefanescu (2010) to instrument *DB_Cover* with industry unionization rate (*iUnion*) and the natural logarithm of one plus firm age (*ln*(1+*Age*)), together with dummy variables for year and industry. The two variables are chosen because they are exogenous to corporate investment decisions but correlated with corporate pension policies. In particular, previous studies find that labor unions are related to labor bargaining power. Hirsch (1992), and Bronars and Deere (1993) show that stronger labor power is associated with significantly lower physical capital and R&D investment. They suggest that to dampen employees' and labor unions' demand for higher compensation, firms would respond strategically to increase their bargaining positions by reducing the investment expenditure, thereby making managers appear to have little room to raise workers' benefits. Perotti and Spier (1993) theoretically propose that firm may use strategic leverage as a bargaining tool to force workers into wage concessions. Later studies show that firms in unionized firms/highly unionized industries tend to have lower cash holdings (Klasa, Maxwell, and Ortiz-Molina, 2009) and higher debt ratios (Matsa, 2010). Therefore, an organized labor force is likely to have substantial negotiation power over the termination or maintenance of DB plans. Shivdasani and Stefanescu (2010) also show that industry unionization is positively related with DB plan offering by firms in the industry. In addition, older firms are more likely to offer DB plans because many of DB plans were set up in the past when labor union power was strong. The data for *iUnion* comes from the Union Membership, and Coverage Database by Barry Hirsch and David Macpherson are available at www.unionstats.com. The database reports industry-level union membership and coverage starting from 1983. *Age* is defined as the number of years a firm has been included in Compustat

North America database.

3.5 Summary statistics

Panel A of Table 1 reports the distribution as well as the summary statistics for key explanatory and investment decision variables of the sample firms by year. The bottom line reports the full-sample summary statistics. As the explanatory variables are lagged by one year relative to the investment decision variables, the summary statistics for *DB_Cover* and *iUnion* are for the period 1990-2013, and the summary statistics for *Merger*, *CrossBorder*, *Diversify*, and *CrossBorder-Diversify* are for the period 1991-2014.

Column 1 shows that the number of sample firms increases from 1990 to 1996, experiences abrupt drops in 1999 and 2000.[9] The number of firms picks up again in 2001, but experiences a gradual decline after 2004. Consistent with the summary statistics documented in previous studies, columns 2&3 indicate that DB-plan coverage (*DB_Cover*) dropped from 30.6% in 1990 to 16.1% in 2012, and the industry unionization rate decreased from 18.8% to 8.3% over the same period of time.

Column 4 presents the intensity of overall merger activity. The number in each entry is the percentage of sample firms acquiring at least one firm in the year. On average, about 10.9% of the sample firms acquire at least one firm in a year. The overall merger activity is volatile over time, peaking at 13-14% in 1996-2000 and plunging to 8% in 2002-2003 after the internet bubble burst. Columns 5-7 report the intensity of merger activity by merger type. Diversifying mergers are more than two times as popular as cross-border mergers on average, but the activities of the two types of mergers vary closely to that of the overall.

[Insert Table 1]

[9] We check with the source document by Buessing and Soto (2006) at the Center for Retirement Research at Boston College, which states that for 1999 and 2000, the information of a significant number of plans is not available.

4. Empirical results

Table 2 reports the results from the logit regressions for major investment decision. In column 1, the dependent variable is a merger indicator that equals one if a firm acquires at least one firm in year *t*+1. To address the potential simultaneity issue, all explanatory variables are lagged one year relative to the dependent variable, or they are measured at year *t*. The result shows that higher DB-plan coverage is associated with a lower propensity of acquisition at a statistical significance of 5%. In terms of the economic magnitude, a one-standard-deviation increase in *DB_Cover* is associated with a 0.062 reduction in odds ratio for acquisition.[10] The signs of other coefficients are consistent with previous studies on mergers and acquisitions. Firms with stronger cash flow, higher valuation and better past stock returns are more likely to acquire others. Large firms are also more likely to be an acquirer than small firms, which probably reflects the fact that large firms have a larger capacity to absorb financial risks and stronger capability to raise external funds for acquisitions than small firms. On the other hand, asset tangibility is negatively related with the propensity of acquisition. A possible explanation is that a high level of tangible assets is generally associated with low growth options. Therefore, firms with high asset tangibility tend to growth internally rather than via acquisitions.

In column 2, the dependent variable is an indicator for large capital expenditure that equals one if a firm's capital expenditure-to-assets ratio is above 90th percentile of the sample firms in year *t*+1. The result indicates that higher DB plan coverage is associated with a lower propensity of large capital expenditure and the result is statistically significant at 1% level. A one-standard-deviation increase in *DB_Cover* is associated with a 0.244 reduction in odds ratio for making large capital expenditure. Consistent with column 1, firms with stronger cash flow, higher valuation and better past stock returns are more likely to invest in fixed assets. However,

[10] In a logit model, the proportional impact of an increase of y for a variable Y on the odds of a positive outcome is estimated as $exp(\alpha \times y) - 1$, where α is the coefficient of Y in the model. As the coefficient of *DB_Cover* in model (1) is -0.214, the impact of a one-standard-deviation reduction in *DB_Cover* on the odds of Acquisition is $exp(-0.214 \times 0.297) - 1 = -0.062$.

as opposed to column 1, large firms are less likely to invest in fixed assets than small firms, and asset tangibility is positively associated with the propensity of large fixed-asset investment. As argued above, smaller firms have weaker ability to absorb risk and raise external financing, so they have to rely more on fixed-asset investments for growth. The positive correlation between asset tangibility and large capital expenditure is consistent with our above argument that high asset tangibility indicates low growth options.

[Insert Table 2]

Table 3 reports the results from multinomial logit regressions for investment decision. In particular, it aims to identify the determinants for capital expenditure versus acquisition decisions. The dependent variable is an indicator that equals zero (0) if a firm makes neither large capital expenditure nor a merger at t+1, one (1) if a firm makes a large capital expenditure no mergers at t+1, and two (2) if a firm completes at least one merger at t+1.

Column 1 reports the choices between no major investment (0) and large capital expenditure (1). The coefficients are close in magnitudes but in opposite signs to that of column 2 of Table 2. As large capital expenditure is the base case, the coefficients reported represent the effects of explanatory variables on the propensity of no major investment. Therefore, the result is consistent with that of column 2 of Table 2.

Column 2 reports the decision between large capital expenditure (1) and acquisition (2). The result indicates that higher DB-plan coverage is significantly related with a higher propensity of acquisition rather than large capital expenditure. A one-standard-deviation increase in *DB_Cover* is associated with a 0.217 increase in odds ratio for acquisition versus large capital expenditure. Surprisingly, cash flow, firm valuation, and past stock return are all negatively linked with the propensity of acquisition versus large capital expenditure. Previous studies show that the merger wave is highly correlated with valuation wave because firms have strong tendency to issue stock to finance their mergers in high valuation for behavioral reasons

(Shleifer and Vishny, 2003; Rhodes-Kropf and Viswanathan, 2004; Rhodes-Kropf, Robinson and Viswanathan, 2005). It turns out that the correlation between capital expenditure and valuation overshadows the correlation between acquisition and valuation. Consistent with Table 2, more tangible assets are related with more capital expenditure and fewer acquisitions.

[Insert Table 3]

Table 4, Panel A examines the impact of DB plan coverage on the choices of mergers. Column 1 reports the multinomial logit regression for the decision between cross-border acquisition and domestic acquisition. The dependent variable is an indicator that equals zero (0) if a firm does not complete any mergers at t+1, one (1) if a firm completes at least one domestic merger but no cross-border merger at t+1, and two (2) if a firm completes at least one cross-border merger at t+1. Result for case (2) versus case (1) is reported. It indicates that higher DB plan coverage is significantly related with a higher propensity of cross-border versus domestic acquisition. A one-standard-deviation increase in *DB_Cover* is associated with a 0.135 increase in odds ratio for cross-border versus domestic acquisition.

Column 2 reports the multinomial logit regression for the decision between diversifying acquisition (2) and horizontal acquisition (1). The result indicates that higher DB plan coverage is associated with a higher propensity of diversifying versus horizontal acquisition, and the result is statistically significant at 5% level. A one-standard-deviation increase in *DB_Cover* is associated with a 0.134 increase in odds ratio for diversifying versus horizontal acquisition. Column 3 combines the cases in columns 1&2 and examines the decision between cross-border or diversifying acquisition (2) and domestic horizontal acquisition (1). The results are qualitative the same as those reported in columns 1&2. DB-plan coverage is positively associated with the propensity of acquiring foreign firms or firms in other industries. The economic magnitude is that a one-standard-deviation increase in DB-plan coverage is

associated with an increase of 0.184 in odds ratio of cross-border or diversifying acquisition versus domestic horizontal acquisition.

Table 4, Panel B examines the impact of DB plan coverage on the type of investment. The dependent variable is an indicator that equals zero (0) if a firm does not make any large capital expenditure or mergers at t+1, one (1) if a firm makes a large capital expenditure but does not complete a merger at t+1, two (2) if a firm completes at least one domestic horizontal merger but no cross-border or diversifying merger at t+1, and three (3) if a firm completes at least one cross-border or diversifying merger at t+1.

Column 1 reports the decision between domestic horizontal acquisition (2) and large capital expenditure (1), and column 2 reports the decision between cross-border or diversifying acquisition (2) and large capital expenditure (1). The result indicates that DB-plan coverage has statistically insignificant impact on the decision between domestic horizontal acquisition and large capital expenditure, while it is positively related with the propensity of cross-border or diversifying acquisition versus large capital expenditure. A possible explanation for the difference is that both capital expenditure and domestic horizontal acquisition are mainly for expanding local production facilities. As a result, the choice between the two should not result in a significant difference in labor bargaining power and financial risk. On the other hand, a cross-border or diversifying acquisition allows the acquirer to stay further away from labor power in its core business or to diversify its financial risk. Therefore, firms with stronger DB-plan coverage are inclined to acquire foreign firms or firms in other industries.

[Insert Table 4]

Although the results above could suggest that firms stay away from labor power by acquiring firms abroad or in other industries, it is also possible that firms maintain DB plans in order to gain support from existing employees and labor unions for their investment plans. For example, foreseeing weakening bargaining power as a result of cross-border and diversifying

acquisitions, existing employees and labor unions may strongly oppose the investments unless they get the employers' guarantee of keeping employees' benefits untouched. Therefore, DB-plan coverage could be a result rather than a driving force of corporate investment decision.

To address the endogeneity issue, we carry out a two stage regression. In the first stage, *DB_Cover* is regressed on the natural logarithm of firm age (*ln*(*Age*)) and the industry unionization rate (*iUnion*), together with year and industry dummy variables. These two variables are chosen because they are exogenous to corporate investment decisions but correlated with corporate pension policies. Shivdasani and Stefanescu (2010) show that industry unionization is positively related with DB plan offering by firms in the industry. In addition, older firms are also more likely to offer DB plans because many of DB plans were set up in the past when labor union power was strong. Column 6 of table 5 reports the first-stage regression result. As expected, firms of older age and in more unionized industries tend to have higher DB plan coverage.

In the second stage, we use the *DB_Cover* estimated from the first stage to re-run our models for Table 4, and report the results in Table 5. Consistent with our previous findings, DB-plan coverage is positively associated with the propensity of cross-border and diversifying acquisitions versus large capital expenditures and domestic horizontal acquisitions, after controlling for endogeneity in pension policies.

[Insert Table 5]

Therefore, our findings are consistent with both bargaining power and financial risk effects of DB-plan coverage. Facing strong labor power, firms under-invest because of the ex-post renegotiation risk over profits from new investments (Bronars and Deere, 1993). Conditional on a large investment, they tend to acquire foreign firms for expansion so that local workers can hardly join force with foreign workers. Competition from foreign workers also weakens local workers' bargaining power as firms can threaten to move operations from the

US to overseas production facilities (Lommerud, Staume and Sorgard, 2006). In addition, firms prefers diversifying acquisitions to horizontal acquisitions when they face strong labor power because diversification can improve their ability to absorb the risk of labor strike by relying less on their core businesses that are under strong labor influence (Rose, 1991). Cross-border or diversifying acquisitions also reduce the likelihood that employees from different original firms to compare their compensation packages with each other and reduce investment inefficiency due to "envy effect".

However, our findings may arise with a firm's need to reduce its financial risk related with the uncertainty in DB-plan liabilities. Cocco and Volpin (2013) find that firms that sponsor DB plans are less likely to be a takeover target. We show that those firms are also less likely to invest in fixed assets or acquire other firms. Besides, their preference for cross-border or diversifying acquisitions over domestic horizontal acquisitions may suggest their need to reduce their financial risks by geographical or product-market diversification.

Tables 6&7 disentangle DB plan's bargaining power effect from its financial risk effect on the cross-border and diversifying acquisitions. If DB plan coverage only represent the source of financial risk, cross-border or diversifying acquisitions would lead to changes in pension expense for firms with higher DB-plan coverage. However, if firms intentionally reduce labor bargaining power by acquiring firms abroad or in other industries, we should observe greater benefits accrued to firms having such action when they have stronger labor power indicated by higher DB-plan coverage. Specifically, we expect that a higher DB-plan coverage is associated with a greater reduction in employees' expense and more improvement in operating performance following the cross-border or diversifying acquisitions. To verify this assumption, we regress change in per capita pension expense and change in operating performance on the indicators of major investments (*LargeCAPX*, *Acquire*, or *CrossBorder-Diversify*) together with other control variables. Besides, we interact the investment indicators with *DB_Cover* to

examine if the benefit from a particular type of investment is greater for firms facing stronger labor bargaining power. If it is true, a higher *DB_Cover* is expected to associate with a larger reduction in pension expense, i.e. a negative coefficient for the interaction term, and a larger increase in operating profitability after a major investment, i.e. a positive coefficient for the interaction term.

It is possible that some unknown factors drive both investment and changes in pension expense and operating performance simultaneously. As a result of the endogeneity problem, an OLS model will produce a biased estimation result. To correct for this bias, we run a two-stage treatment effect model to examine the impact of a major investment on changes in pension expense and operating performance. The first stage is the treatment equation for the major investment decision:

$$Treat_{t+1} = 1 \; if \; \alpha_0 + \alpha_1 DB\_Cover_t + \alpha_2 CashFlow_t + \alpha_3 Q_t + \alpha_4 Size_t + \alpha_5 Tang_t + \alpha_6 WC_t + \alpha_7 Div_t + \alpha_8 CumRet_t + \sum_{i=1991}^{2013} \alpha_{yr,i} Yrdum_{i,t} + \sum_{j=21}^{39} \alpha_{ind,j} SIC2_{j,t} + u_t > 0;$$

0 otherwise (1)

Treat is one of the *LargeCAPX*, *Acquire*, and *CrossBorder-Diversify*. The hazard for each observation is then computed and added to the following second-stage regression for the change in pension expense or operating performance:

$$\Delta(Pen/Emp)_{t,t+2} \; or \; \Delta(EBITD/Asset)_{t,t+2} = \gamma_0 + \gamma_1 Q_t + \gamma_2 Size_t + \gamma_3 TDB_t + \gamma_4 DB\_Cover_t + \gamma_5 Treat_{t+1} + \gamma_6 DB\_Cover_t \times Treat_{t+1} + \sum_{i=1991}^{2013} \gamma_{yr,i} Yrdum_{i,t} + \sum_{j=21}^{39} \gamma_{ind,j} SIC2_{j,t} + \varepsilon_t \quad (2)$$

$\Delta(Pen/Emp)_{t,t+2}$ is change in pension expense per employee from *t* to *t*+2, and $\Delta(EBITD/Asset)_{t,t+2}$ is change in earnings before interest, taxes and depreciation, scaled by lagged total assets from *t* to *t*+2.

Panel A of Table 6 reports the estimation results for the outcome model (2). Panel B summarizes the results for the treatment equation (1). They are qualitatively similar r to those reported in the previous tables that higher DB-plan coverage is associated with a lower

propensity of large capital expenditure (column 1) and acquisition (column 2), but a higher propensity of cross-border or diversifying acquisition relative to large capital expenditure or domestic horizontal acquisition (columns 3&4).

Panel A reports the regressions for the outcome equation for $\Delta(Pen/Emp)_{t,t+2}$. In column 1, the treatment (*Treat*) is large capital expenditure (*LargeCAPX*), defined as capital expenditure-to-assets ratio above 90th percentile of sample firms in the year. The result shows that without a major investment, a higher DB plan coverage is associated with a more positive change in pension expense, as suggested by the positive and statistically significant coefficient of *DB_Cover*. This is consistent with our argument that DB-plan coverage is positively associated with labor bargaining power. Although large capital expenditure does not significantly affect pension expense in general, it increases pension expense for firms with higher DB plan coverage as indicated by the positive coefficient of *LargeCAPX* × *DB_Cover*. Therefore, large capital expenditures cause higher DB-plan firms to spend more on pension. In column 2, the treatment is acquisition (*Acquire*). The result shows that acquisitions result in significantly lower pension expense, as indicated by the negative and statistically significant coefficient of *Acquire*. As opposed to column 1, acquisitions cause firms with higher DB plan coverage to spend less on pension expenditure, though the coefficient on *Acquire* × *DB_Cover* is statistically insignificant. In column 3, the treatment is cross-border or diversifying acquisition (*CrossBorder-Diversify*). In order to directly compare cross-border or diversifying acquisition with large capital expenditure or domestic horizontal acquisition, the model is estimated for firms making large investments only, i.e. *LargeCAPX* = 1 or *Acquire* = 1. The result shows that cross-border or diversifying acquisitions cause higher DB-plan firms to spend less on pension, as indicated by the negative and statistically significant coefficient of *CrossBorder-Diversify* × *DB_Cover*. Column 4 reports the same regression as column 3 with *DB_Cover* replaced by its instrument. The result is qualitatively the same.

[Insert Table 6]

Table 7 reports the results from the treatment-effect model for $\Delta(EBITD/Asset)_{t,t+2}$. The model is specified similar to that of Table 6. The result shows that without a major investment, DB plan coverage has no measurable effect on firm performance, as indicated by the insignificant coefficient of *DB_Cover*. However, large capital expenditures negatively affect firms' performance, especially for firms with high DB-plan coverage (column 1). The finding mirrors the result in column 1 of Table 6 that large capital expenditures increase pension expense especially for high DB-plan firms. Taking together, we suggest that large capital expenditures destroy value for high DB-plan firms. On the other hand, while acquisitions also result in worse operating performance, the effect is weaker for firms with higher DB-plan coverage (column 2). The finding suggests that acquisitions create value for high DB-plan firms. Besides, cross-border or diversifying acquisitions create more value for high DB-plan firms than large capital expenditures or domestic horizontal acquisitions (columns 3&4).

[Insert Table 7]

Our study of the real impacts of DB-plan coverage is different from previous studies in three major ways. First, unlike previous studies that mostly examine the impacts of employee's bargaining power on the level of per capita wage (e.g. Rose, 1991; Clougherty et al. 2014), we examine the impacts of DB-plan coverage on per capita pension expense because wage information is missing for more than 80% of firms in Compustat overall, and the missing value problem is particularly severe for our sample of manufacturing firms (only 898 out of 27,883 firm-years report labor expense). Second, we examine the change in pension expense instead of the level of pension expense to reduce the impacts of employees' age and tenure that affect pension expense but are unavailable in our data. As employee's pension is always tied to wage, the change in pension expense should reflect the change in overall compensation. Third, we

explicitly control for the endogeneity problem in our modeling for the impact of investment choice on pension expense and operating performance.

In sum, the results in Tables 6&7 suggest that cross-border or diversifying acquisitions result in lower pension expense and better firm performance for high DB-plan firms while large capital expenditures or domestic horizontal acquisitions do not result in similar improvements. The result suggests that DB-plan coverage is a good proxy for labor bargaining power. By cross-border or diversifying acquisitions, high DB-plan firms can make their new investments out of touch by existing employees and weaken the employees' bargaining power.

5. Relation with other studies in cross-border acquisitions

Previous studies for cross-border mergers have identified country-levels and industry-level factors that are not included in our baseline models. Many studies suggest that a spillover of good governance standards from the bidder to the target creates value. For example, Rossi and Volpin (2004) finds that countries with better accounting standards and stronger shareholder protection have more M&A activities, and that cross-border mergers are mostly initiated by firms in countries with better investor protection to acquire firms in countries with weaker investor protection. Martynova and Renneboog (2008) show that takeover returns are positively related to the difference between the bidder and target country-level corporate governance. Bris, Brisley and Cabolis (2008) find that industry valuation increases when firms in the industry are acquired by firms in other countries with better investor protection and accounting standards. Bris and Cabolis (2008) find that bidders from countries with better shareholder protection and accounting standards pay a higher merger premium in cross-border mergers relative to matching domestic mergers. Lel and Miller (2015) document that after a country passes a takeover law, poorly performing firms experience a higher probability of being taken over. Taxation is another consideration when firms choose between domestic and cross-

border acquisitions. Scholes and Wolfson (1990) show that the Tax Reform Act of 1986 that discourages tax-induced M&A activity reduces domestic M&A activity but increases the demand for foreign acquisitions. Huizinga and Voget (2009) show that double taxation of foreign subsidiaries' income reduce the incentives to acquire foreign firms. Erel, Liao and Weisbach (2012) find that cross-border mergers are likely to happen if the tax rate in the bidder's country is higher than that of the target's country. Geographic and cultural distances also affect M&A activity between two countries. Erel, Liao and Weisbach (2012) show cross-border mergers are more likely to happen between two countries if the two countries are geographically close to each other and they have more bilateral trades. Ahern, Daminelli and Fracassi (2015) show that M&A activity between two countries is more intensive if they are culturally close in terms of trust, hierarchy and individualism. Besides, greater distances in trust and individualism result in lower combined merger announcement returns.

However, as our study assesses US firms' investment decisions, we cannot include those country-level factors in our analysis. Instead, we create several industry-level or firm-level substitutes to address some of those issues. First, we control for cross-border trades at industry-level. We collect import and export values at Harmonized System (HS) level from Peter Schott's website in 1990-2012, aggregate the HS product-level values into industry-level levels, and calculate the industry's share of import (export) in a year as its import (export) value divided by the total import (export) value of all industries in the year.[11] We expect an industry's demand for cross-border acquisitions are correlated with its international trade volume.

Second, we collect firm-level after-interest marginal tax rates by Blouin, Core and Guay (2010). Foley et al. (2007) document that many firms hold excess cash abroad because of facing high repatriation taxes on their foreign incomes. Therefore, we expect firms facing higher

[11] The data is available at http://faculty.som.yale.edu/peterschott/sub_international.htm and it is funded by Yale Social Sciences Library. We thank Peter Schott to make it available free for academic use. See Pierce and Schott (2012) for detailed documentation of concordance between HS System codes and SIC/NAICS codes.

marginal tax rates on their incomes are more likely to explore foreign opportunities for reducing their tax expenses.

Third, we include the yearly intensity of cross-border (diversifying) acquisitions at industry level, defined as the number of cross-border (diversifying) acquisitions divided by the total number of acquisitions in the industry. The two variables control for unknown industry factors that drive the differences in cross-border and diversifying acquisitions across industries. Besides, Clougherty et al. (2014) find that a higher cross-border mergers in a highly unionized industry, particularly those involve firms in same industry, results in lower wages for rival firms. Therefore, we include the variables in both the choice model and the models for changes in pension expense and operating performance.

Fourth, we include institutional ownership to account for the degree of institutional monitoring. Ferreira, Massa and Matos (2010) find that foreign institutional ownership increases the completion rate of cross-border acquisition and they argue that foreign institutions help reduce the information asymmetry between bidders and targets. As US institutions are supposed to be sophisticated in collecting and processing information, we expect a higher level of institutional ownership should increase a firm's probability to acquire a foreign firm. However, previous studies also suggest that short-termism of institutional investors lead to managerial short-termism, resulting in distorted corporate decisions. For example, Bushee (1998) finds that short-term institutional holding causes corporate managers to engage less in research and development that provides long-term benefits but results in short-term downward pressure on earnings. Gaspar, Massa and Matos (2005) find that target firms with short-term institutional investors are likely to get lower premiums. They attribute the finding to weak monitoring from short-term investors that allow managers to seek private benefits rather than maximize proceeds from acquisitions. Similarly, Chen, Harford and Li (2007) find that independent long-term institutional holding is positively related to post-merger stock

performance and operating performance. To calculate short-term and long-term institutional holdings, we base on investor classification by Brian Bushee to classify institutional investors into dedicated investors, quasi-indexers, and transient investors.[12]We then obtain institutional holding data from Thomson Reuters Institutional (13f) Holdings. Dedicated (Transient) ownership for each quarter is the number of shares held by dedicated (transient) investors divided by the total number of shares outstanding at the end of quarter. We then average the quarterly measures into annual ones.

Table 8 reports the results with additional controls added. As the import/export data is available up to 2012 only and some of the variables have missing values for some firms or industries, the numbers of observations are lower than those reported in previous tables. Panel A reports the result from multinomial model for investment choices. The model is specified similarly to that for Panel B of Table 4, with additional control variables added. As reported above, the result indicates that after controlling for industry's international trading activity and cross-border and diversifying acquisition activity as well as firm's tax rate and institutional ownership, DB plan coverage is still negatively related to the propensity of making a major investment (column 1). Besides, conditional to a major investment, firms are likely to acquire firms abroad or in other industries than to invest in fixed assets or acquire a domestic firm in same industry (columns 2&3). Therefore, our main results in Table 4 are robust to the presence of additional controls.

Panel B reports the impacts of cross-border acquisitions on pension expense and operating performance, conditional on a major investment decision (i.e. *LargeCAPX* = 1 or *Acquire* = 1). The model is specified similarly to that for column 3 of Tables 6&7, with additional controls added. For brevity, the first-stage investment choice model is not reported but will be available upon request. In addition, we interact DB plan coverage with industry

[12] The classification data is available at http://acct.wharton.upenn.edu/faculty/bushee/IIclass.html. We thank Brian Bushee to make the data available free for academic use.

intensities of cross-border and diversifying acquisitions because Clougherty et al. (2014) show that cross-border merger activity in an industry results in lower wages for rival firms when the industry unionization rate is high. Column 1 shows that after controlling for additional factors for the investment choice and the effect of industry cross-border and diversifying acquisition activity on pension expense, a firm's decision to acquire firms abroad or in other industries still results in lower per-capita pension expense when DB plan coverage is high. Besides, column 2 shows that when DB plan coverage is high, cross-border or diversifying acquisitions enhance operating performance. Therefore, our results in Tables 6&7 are also robust to the presence of additional controls.

[Insert Table 8]

6. Conclusion

Using a sample of 27,883 firm-years, we examine the US manufacturing firms in 1990-2013 and find that DB-plan coverage is negatively associated with the propensity of a major investment, defined as a large capital expenditure or an acquisition of firm. However, conditional on a major investment decision, a firm with higher DB-plan coverage is more likely to acquire than to invest in fixed assets. More interestingly, we find that among acquisitions, a firm with high DB-plan coverage prefers cross-border or diversifying acquisitions to domestic horizontal acquisitions. In addition, cross-border or diversifying acquisitions done by firms with higher DB-plan coverage result in a larger reduction in pension expense and more improvement in operating performance. Therefore, cross-border or diversifying acquisitions by high DB-plan firms create more value than those by low DB-plan firms. However, large capital expenditures by high DB-plan firms create less value than those by low DB-plan firms.

Our results suggest that DB pension plans affect the choice between capital expenditure and various forms of acquisition. As the DB-plan coverage represents the employees'

bargaining power, firms respond strategically in their investment decisions. The renegotiation risk causes firms to under-invest in face of strong labor bargaining power, but the cross-border or diversifying acquisitions weaken labor bargaining power by making employees from different countries or industries less likely to be aligned. Our study offers empirical evidence to support theoretical predictions from previous studies (Lommerud, Straume and Sorgard, 2003, 2006; Eckel and Egger, 2009). In addition, previous empirical results (Cocco and Volpin, 2013; Tian and Wang, 2014) suggest strong labor create additional risk and burden on firm, which affects firms' investment. However, our tests on post-investment changes in pension expense and operating performance suggest that firms can invest strategically to increase their bargaining power versus employees.

References

Ahern, K.R., Daminelli, D., Fracassi, C., 2015. Lost in translation? The effect of cultural values on mergers around the world. Journal of Financial Economics 117, 165-189.

Akerlof, G.A., Yellen, J.L. 1990. The fair wage-effort hypothesis and unemployment. Quarterly Journal of Economics 105, 255-283.

Bakke, T., Whited, T.M., 2012. Threshold events and identification: A study of cash shortfalls. Journal of Finance 67, 1083-1111.

Baldwin, C.Y., 1983. Productivity and labor unions: An application of the theory of self-enforcing contracts. Journal of Business 56, 155-185.

Blouin, J., Core, J.E., Guay, W., 2010. Have the tax benefits of debt been overestimated? Journal of Financial Economics 98, 195-213.

Bris, A., Brisley, N., Cabolis, C., 2008. Adopting better corporate governance: Evidence from cross-border mergers. Journal of Corporate Finance 14, 224-240.

Bris, A., Cabolis, C., 2008. The value of investor protection: Firm evidence from cross-border mergers. Review of Financial Studies 21, 605-648.

Bronars, S.G., Deere, D.R., 1993. Unionization, incomplete contracting, and capital investment. Journal of Business 66, 117-132.

Broadbent, J., Palumbo, M., Woodman, E., 2006. The shift from defined benefit to defined contribution pension plans – Implications for asset allocation and risk management. Working paper.

Buessing, M., Soto, M., 2006. The State of Private Pensions: Current 5500 Data. Issue in Brief (February 2006), Center for Retirement Research at Boston College.

Bushee, B.J., 1998. The influence of institutional investors on myopic R&D investment behavior. The Accounting Review 73, 205-333.

Chang, X. S., Kang, J. K., Zhang, W., 2012. Employees as creditors: The disciplinary role of pension deficits in the market for corporate control. Working paper.

Chen, X., Harford, J., Li, K., 2007. Monitoring: which institutions matter? Journal of Financial Economics 86, 279-305.

Clougherty, J.A., Gugler, K., Sorgard, L., Szucs, F.W., 2014. Cross-border mergers and domestic-firm wages: Integrating “spillover effects” and “bargaining effects”. Journal of International Business Studies 45, 450-470.

Cocco, J., Volpin, P., 2013. Corporate pension plans as takeover deterrents. Journal of Financial and Quantitative Analysis 48, 1119-1144.

Comprix, J., Muller, K.A., 2011. Pension plan accounting estimates and the freezing of defined benefit pension plans. Journal of Accounting and Economics 51, 115-133.

Eckel, C., Egger, H., 2009. Wage bargaining and multinational firms. Journal of International Economics 77, 206-214.

Erel, I., Liao, R.C., Weisbach, M.S., 2012. Determinants of cross-border mergers and acquisitions. Journal of Finance 67, 1045-1082.

Ferreira, M.A., Massa, M., Matos, P., 2010. Shareholders at the gate? Institutional investors and cross-border mergers and acquisitions. Review of Financial Studies 23, 601-644.

Foley, C.F., Hartzell, J.C., Titman, S., Twite, G., 2007. Why do firms hold so much cash? A tax-based explanation. Journal of Financial Economics 86, 579-607.

Frank, R.H., 1984. Are workers paid their marginal products? American Economic Review 74, 549-571.

Gaspar, J., Massa, M., Matos, P., 2005. Shareholder investment horizons and the market for corporate control. Journal of Financial Economics 76, 135-165.

Goel, A.M., Thakor, A.V., 2005. Green with envy: Implications for corporate investment distortions. Journal of Business 78, 2255-2287.

Greene, W.H., 2008. Econometric analysis, 6th edition. Prentice Hall.

Grout, P.A., 1984. Investment and wages in the absence of binding contracts: A Nash bargaining approach. Econometrica 52, 449-460.

Hirsch, B.T., 1992. Firm investment behavior and collective bargaining strategy. Industrial Relations 31, 95-121.

Huizinga, H.P., Voget, J., 2009. International taxation and the direction and volume of cross-border M&As. Journal of Finance 64, 1217-1249

Kapinos, K.A., 2009. On the determinants of defined benefit pension plan conversions. Journal of Labor Research 30, 149-167.

Klasa, S., Maxwell, W.F., Ortiz-Molina, H., 2009. The strategic use of corporate cash holdings in collective bargaining with labor unions. Journal of Financial Economics 92, 421-442.

Lazear, E.P., 1989. Pay equality and industrial politics. Journal of Political Economy 97, 561-580.

Lel, U., Miller, D.P., 2015. Does takeover activity cause managerial discipline? Evidence from international M&A laws. Review of Financial Studies 28, 1588-1622.

Lommerud, K.E., Meland, F., Sorgard, L., 2003. Unionised oligopoly, trade liberalization, and location choice. Economic Journal 113, 782-800.

Lommerud, K.E., Straume, O.R., Sorgard, L., 2006. National versus international mergers in unionized oligopoly. RAND Journal of Economics 37, 212-233.

Martynova, M., Renneboog, L., 2008. Spillover of corporate governance standards in cross-border mergers and acquisitions. Journal of Corporate Finance 14, 200-223.

Matsa, D. A., 2010. Capital structure as a strategic variable: Evidence from collective bargaining. The Journal of Finance, 65, 1197-1232.

Perotti, E. C., Spier, K. E. 1993. Capital structure as a bargaining tool: The role of leverage in contract renegotiation. The American Economic Review 83, 1131-1141.

Pierce, J.R., Schott, P.K., 2012. A concordance between ten-digit U.S. Harmonized System codes and SIC/NAICS product classes and industries. 2012. Journal of Economic and Social Measurement 37, 61-96.

Rauh, J.D., 2006. Investment and Financing Constraints: Evidence from the Funding of Corporate Pension Plans. The Journal of Finance 61, 33-71

Rauh, J.D., Stefanescu, I., Zeldes, S.P., 2013. Cost shifting and the freezing of corporate pension plans. Working paper.

Rhode-Kropf, M., Robinson, D.T., Viswanathan, S., 2005. Valuation waves and merger activity: The empirical evidence. Journal of Financial Economics 77, 561-603.

Rhodes-Kropf, M., Viswanathan, S., 2004. Market valuation and merger waves. Journal of Finance 59, 2685–2718.

Rose, D.C., 1991. Are strikes less effective in conglomerate firms? Industrial and Labor Relations Review 45, 131-144.

Rossi, S., Volpin, P.F., 2004. Cross-country determinants of mergers and acquisitions. Journal of Financial Economics 74, 277-304.

Scholes, M.S., Wolfson, M.A., 1990. The effects of changes in tax laws on corporate reorganization activity. Journal of Business 63, 141-164.

Shivdasani, A., Stefanescu, I., 2010. How do pensions affect corporate capital structure decisions? Review of Financial Studies 23, 1287-1323.

Shleifer, A., Vishny, R., 2003. Stock market driven acquisitions. Journal of Financial Economics 70, 295–311.

Tian, X., Wang, W., 2014. Hard marriage with heavy burdens: Labor unions as takeover deterrents. Working paper, Indiana University.

Table 1 Distribution of sample and summary statistics of key variables

The sample consists of all manufacturing firms (SIC 2000-3999) that files IRS Form 5500 for their eligible pension plans with over 100 participants and are covered by CRSP/Compustat Merged Database from 1990 to 2013. Firms with missing variables for key regressions are also excluded.

Panel A reports the sample distribution, and summary statistics for DB-plan coverage (*DB_Cover*), industry unionization rate (*iUnion*), and variables for major investment decisions. Mean values by year and overall are reported. *DB_Cover* is the ratio of DB-plan assets to total pension-plan assets based on information in IRS Form 5000 filings. *iUnion* comes from the Union Membership and Coverage Database by Barry Hirsch and David Macpherson and available at www.unionstats.com. *Acquire* equals one if a firm acquires at least one firm in the year. *CrossBorder* equals one if a firm acquires at least one firm outside the United States in the year, *Diversify* equals one if a firm acquires at least one firm in other industry, i.e. belonging to a different 4-digit SIC code, and *CrossBorder-Diversify* equals one if *CrossBorder* equals one or *Diversify* equals one.

Panel B reports the summary statistics for explanatory variables. *DB_Cover* and *iUnion* are defined above. *CashFlow* is the sum of net income and depreciation minus dividends, divided by lagged total assets. *Q* is the market-to-book ratio of assets. *Size* is the natural logarithm of total assets in 2005 constant value. *Tang* is net property, plant and equipment scaled by total assets. *WC* is net working capital less cash, divided by total assets. *Div* is cash dividend divided by lagged total assets. *CumRet* is the 12-month cumulative stock return in fiscal year. *Age* is firm age defined as the number of years a firm has appeared in Compustat database up to year t. *TDB* is total liabilities divided by total assets. $\Delta(Pen/Emp)$ is the change in pension expense per employee from *t* to *t*+2. $\Delta(EBITD/Asset)$ is the change in earnings before interest, taxes and depreciation, scaled by lagged total assets from *t* to *t*+2. *CAPX* is capital expenditure divided by lagged total assets. *Cash* is cash and equivalent divided by total assets. The variables are winsorized at 1st and 99th percentiles of respective distributions.

Panel A	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Year	N	*DB_Cover*	*iUnion*	*Acquire*	*CrossBorder*	*Diversify*	*CrossBorder-Diversify*
1990	1,071	0.306	0.188				
1991	1,092	0.307	0.187	0.047	0.008	0.036	0.038
1992	1,139	0.276	0.181	0.069	0.016	0.052	0.055
1993	1,222	0.255	0.169	0.084	0.021	0.061	0.070
1994	1,364	0.241	0.165	0.087	0.024	0.068	0.074
1995	1,441	0.225	0.156	0.122	0.037	0.090	0.102
1996	1,472	0.211	0.152	0.133	0.040	0.099	0.109
1997	1,466	0.197	0.144	0.135	0.041	0.101	0.111
1998	1,405	0.193	0.137	0.141	0.052	0.107	0.116
1999	1,062	0.197	0.134	0.143	0.038	0.107	0.116
2000	1,079	0.182	0.120	0.142	0.039	0.102	0.106
2001	1,263	0.160	0.113	0.115	0.026	0.082	0.090
2002	1,231	0.155	0.111	0.080	0.021	0.057	0.063
2003	1,234	0.162	0.102	0.079	0.018	0.057	0.060
2004	1,158	0.149	0.098	0.121	0.043	0.088	0.100
2005	1,161	0.164	0.096	0.113	0.036	0.076	0.090
2006	1,103	0.148	0.089	0.120	0.044	0.086	0.099
2007	1,079	0.145	0.087	0.135	0.046	0.091	0.101
2008	1,095	0.152	0.084	0.105	0.034	0.074	0.082
2009	1,011	0.146	0.085	0.073	0.022	0.045	0.051
2010	977	0.162	0.077	0.110	0.051	0.075	0.093
2011	946	0.169	0.082	0.113	0.046	0.089	0.098
2012	922	0.165	0.075	0.101	0.035	0.071	0.081
2013	890	0.161	0.083	0.098	0.041	0.067	0.081
2014				0.113	0.044	0.081	0.093
Total	27,883	0.194	0.124	0.109	0.034	0.079	0.088

Panel B	(1) Mean	(2) Median	(3) Minimum	(4) Maximum	(5) Standard deviation	(6) N
DB_Cover	0.194	0	0	1	0.297	27,883
CashFlow	0.059	0.091	-0.704	0.399	0.170	27,883
Q	1.898	1.466	0.584	8.292	1.339	27,883
Size	5.956	5.769	2.677	10.584	1.804	27,883
Tang	0.241	0.209	0.015	0.717	0.158	27,883
WC	0.145	0.141	-0.318	0.553	0.163	27,883
Div	0.011	0	0	0.107	0.019	27,883
CumRet	0.167	0.066	-0.809	3.179	0.634	27,883
iUnion	0.124	0.096	0	0.614	0.103	27,883
Age	22.1	18	2	60	15.3	27,883
TDB	0.466	0.456	0.068	1.275	0.238	27,808
$\Delta(Pen/Emp)$	0.186	0.047	-4.181	6.437	1.301	20,853
$\Delta(EBITD/Asset)$	-0.008	-0.004	-0.472	0.437	0.129	25,185
CAPX	0.056	0.041	-0.002	1.546	0.058	27,876
Cash	0.184	0.102	0	0.856	0.206	27,883

Table 2 DB plans and major investment decision

$$Prob(InvDum_{t+1} = 1) = \Psi(\alpha_0 + \alpha_1 DB\_Cover_t + \alpha_2 CashFlow_t + \alpha_3 Q_t + \alpha_4 Size_t + \alpha_5 Tang_t + \alpha_6 WC_t + \alpha_7 Div_t + \alpha_8 CumRet_t + \sum_{i=1991}^{2013} \alpha_{yr,i} Yrdum_{i,t} + \sum_{j=21}^{39} \alpha_{ind,j} SIC2_{j,t})$$

The dependent variable is an indicator for major investment decision at *t*+1. In column 1, the indicator equals one if a firm completes at least one acquisition at *t*+1. In column 2, the indicator equals one if capital expenditure-to-assets ratio in year *t*+1 is above 90th percentile of sample firms in the year. The explanatory variables include *DB_Cover*, *CashFlow*, *Q*, *Size*, *Tang*, *WC*, *Div*, and *CumRet*. All explanatory variables are defined in Table 1 and are measured as of time *t*.

Regressions are estimated with logit. Ψ is the logistic transformation of the linear combination of the explanatory variables. Therefore, the probability that firm *k* makes major investment in year *t*+1 is modelled as,

$$Prob(InvDum_{kt+1} = 1|w_{kt}) = \frac{\exp(w_{kt}'\beta)}{1+\exp(w_{kt}'\beta)}.$$

where w_{kt} is a set of explanatory variables for firm *k* at year *t* as defined above, and β is the set of estimated coefficients of the model. Year dummies and dummies for 2-digit SIC industries are added but not reported. The standard errors are reported in the parentheses. *,**,*** represent 10%, 5% and 1% significant levels respectively.

	(1)	(2)
Indicator	Acquisition	Large capital expenditure
DB_Cover	-0.214**	-0.942***
	(0.095)	(0.146)
CashFlow	1.432***	2.788***
	(0.210)	(0.288)
Q	0.098***	0.382***
	(0.019)	(0.023)
Size	0.408***	-0.125***
	(0.018)	(0.027)
Tang	-1.709***	6.802***
	(0.215)	(0.250)
WC	0.051	-0.190
	(0.183)	(0.267)
Div	-1.426	-8.242***
	(1.357)	(1.871)
CumRet	0.127***	0.272***
	(0.035)	(0.035)
Year dummies	Yes	Yes
Industry dummies	Yes	Yes
Pseudo R-sq	0.098	0.198
N	27,883	27,883

Table 3 DB plans and the choice between capital expenditure and mergers

The dependent variable is an indicator (*InvType*) that equals zero (0) if a firm neither makes large capital expenditure nor completes an acquisition at *t*+1, one (1) if a firm makes a large capital expenditure but does not complete an acquisition at t+1, and two (2) if a firm completes at least one acquisition at *t*+1. A capital expenditure is large if the capital expenditure-to-assets ratio is above 90th percentile of the sample firms in the year.

All explanatory variables are measured as of time *t*. Regression models are estimated with multinomial logit, with case (1) as the base case. The probability that firm *k* choose *j* in year *t*+1 is modelled as,

$$Prob(InvType_{kt+1} = j|w_{kt}) = \frac{\exp(w'_{kt}\beta_j)}{\sum_{j=0}^{N}\exp(w'_{kt}\beta_j)}, \text{ where } j = 0, 1, 2.$$

w_{kt} is a set of explanatory variables for firm k at year *t*, which include *DB_Cover*, *CashFlow*, *Q*, *Size*, *Tang*, *WC*, *Div*, and *CumRet*, as defined in Table 1. β_j is the set of estimated coefficients for choice *j*. As case (1) is the base case, the set of coefficients β_1 are set to zeros.

Result for case (0) versus case (1) is reported in column 1, result for case (2) versus case (1) is reported in column 2. Year dummies and dummies for 2-digit SIC industries are added but not reported. The standard errors are reported in the parentheses. *,**,*** represent 10%, 5% and 1% significant levels respectively.

	(1) No major investment (0) vs large CAPX (1, base)	(2) Acquisition (2) vs large CAPX (1, base)
DB_Cover	0.959***	0.661***
	(0.149)	(0.168)
CashFlow	-2.775***	-1.071***
	(0.293)	(0.340)
Q	-0.389***	-0.232***
	(0.024)	(0.026)
Size	0.122***	0.518***
	(0.028)	(0.032)
Tang	-6.626***	-7.555***
	(0.248)	(0.302)
WC	0.278	0.267
	(0.273)	(0.305)
Div	7.053***	4.332**
	(1.874)	(2.151)
CumRet	-0.273***	-0.106**
	(0.036)	(0.047)
Year dummies	Yes	Yes
Industry dummies	Yes	Yes
Pseudo R-sq	0.143	
N	27,883	

Table 4 DB plans and type of acquisition

Panel A reports the multinomial logit regressions for the choice between different types of acquisition. In column 1, the dependent variable is an indicator that equals zero (0) if a firm does not complete an acquisition at *t*+1, one (1) if a firm completes at least one domestic acquisition but no cross-border acquisition at *t*+1, and two (2) if a firm completes at least one cross-border acquisition at *t*+1. In column 2, the dependent variable is an indicator that equals zero (0) if a firm does not complete an acquisition at *t*+1, one (1) if a firm completes at least one horizontal acquisition but no diversifying acquisition at *t*+1, and two (2) if a firm completes at least one diversifying acquisition at *t*+1. In column 3, the dependent variable is an indicator that equals zero (0) if a firm does not complete an acquisition at *t*+1, one (1) if a firm completes at least one domestic horizontal acquisition but no cross-border or diversifying acquisition at *t*+1, and two (2) if a firm completes at least one cross-border or diversifying acquisition at *t*+1. Case (1) as the base case. Result for case (2) versus case (1) is reported.

Panel B reports the multinomial logit regression for the choice between large capital expenditure and different types of acquisition. The dependent variable is an indicator that equals zero (0) if a firm neither makes large capital expenditure nor completes an acquisition at *t*+1, one (1) if a firm makes a large capital expenditure but does not complete an acquisition at *t*+1, two (2) if a firm completes at least one domestic horizontal acquisition but no cross-border or diversifying acquisition at *t*+1, and three (3) if a firm completes at least one cross-border or diversifying acquisition at *t*+1. Case (1) as the base case. Result for case (2) versus case (1) is reported in column 1 and result for case (3) versus case (1) is reported in column 2.

The explanatory variables include *DB_Cover*, *CashFlow*, *Q*, *Size*, *Tang*, *WC*, *Div*, and *CumRet*. All explanatory variables are defined in Table 1 and are measured as of time *t*. Year dummies and dummies for 2-digit SIC industries are added but not reported. The standard errors are reported in the parentheses. *,**,*** represent 10%, 5% and 1% significant levels respectively.

Panel A	(1) Cross-border (2) vs Domestic (1, base)	(2) Diversifying (2) vs Horizontal (1, base)	(3) Cross-border or diversifying (2) vs Domestic horizontal (1, base)
DB_Cover	0.425**	0.424**	0.568**
	(0.171)	(0.192)	(0.230)
CashFlow	-0.292	0.202	0.190
	(0.405)	(0.378)	(0.416)
Q	0.003	-0.008	-0.015
	(0.035)	(0.033)	(0.034)
Size	0.208***	0.089***	0.139***
	(0.031)	(0.032)	(0.034)
Tang	1.018**	-1.082***	-1.002**
	(0.419)	(0.412)	(0.457)
WC	1.201***	0.963***	1.167***
	(0.348)	(0.355)	(0.379)
Div	-1.768	2.201	3.537
	(2.564)	(3.005)	(3.109)
CumRet	0.137**	0.010	0.046
	(0.069)	(0.072)	(0.082)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Pseudo R-sq	0.093	0.089	0.094
N	27,883	27,883	27,883

Panel B	(1) Domestic horizontal (2) vs large CAPX (1, base)	(2) Cross-border or diversifying (3) vs large CAPX (1, base)
DB_Cover	0.179	0.762***
	(0.251)	(0.174)
CashFlow	-1.123**	-0.986***
	(0.460)	(0.357)
Q	-0.218***	-0.239***
	(0.035)	(0.028)
Size	0.407***	0.548***
	(0.042)	(0.033)
Tang	-6.655***	-7.791***
	(0.493)	(0.312)
WC	-0.661	0.530*
	(0.429)	(0.314)
Div	1.333	5.102**
	(3.386)	(2.215)
CumRet	-0.136*	-0.097**
	(0.081)	(0.049)
Year dummies	Yes	Yes
Industry dummies	Yes	Yes
Pseudo R-sq	0.136	
N	27,883	

Table 5 Instrumental variable approach

Columns 1-3 report the multinomial logit regressions for the choice between different types of acquisition. For column 1, the dependent variable is an indicator that equals zero (0) if a firm does not complete an acquisition at t+1, one (1) if a firm completes at least one domestic acquisition but no cross-border acquisition at t+1, and two (2) if a firm completes at least one cross-border acquisition at t+1. For column 2, the dependent variable is an indicator that equals zero (0) if a firm does not complete an acquisition at t+1, one (1) if a firm completes at least one horizontal acquisition but no diversifying acquisition at t+1, and two (2) if a firm completes at least one diversifying acquisition at t+1. For column 3, the dependent variable is an indicator that equals zero (0) if a firm does not complete an acquisition at t+1, one (1) if a firm completes at least one domestic horizontal acquisition but no cross-border or diversifying acquisition at t+1, and two (2) if a firm completes at least one cross-border or diversifying acquisition at t+1. Case (1) as the base case. Result for case (2) versus case (1) is reported.

Columns 4-5 report the multinomial logit regression for the choice between large capital expenditure and different types of acquisition. The dependent variable is an indicator that equals zero (0) if a firm neither makes large capital expenditure nor completes an acquisition at t+1, one (1) if a firm makes a large capital expenditure but does not complete an acquisition at t+1, two (2) if a firm completes at least one domestic horizontal acquisition but no cross-border or diversifying acquisition at t+1, and three (3) if a firm completes at least one cross-border or diversifying acquisition at t+1. Case (1) as the base case. Result for case (2) versus case (1) is reported in column 4 and result for case (3) versus case (1) is reported in column 5.

DB_Cover is instrumented by *ln*(1+*Age*) and *iUnion*, together with year dummies and dummies for 2-digit SIC industries. The first-stage OLS regression result is reported in column 6. Other explanatory variables include *CashFlow*, *Q*, *Size*, *Tang*, *WC*, *Div*, and *CumRet*, which are defined in Table 1 and are measured as of time *t*. Year dummies and dummies for 2-digit SIC industries are added but not reported. The standard errors are reported in the parentheses. *,**,*** represent 10%, 5% and 1% significant levels respectively.

	(1) Cross-border (2) vs Domestic (1, base)	(2) Diversifying (2) vs Horizontal (1, base)	(3) Cross-border or diversifying (2) vs Domestic horizontal (1, base)	(4) Domestic Horizontal (2) vs large CAPX (1, base)	(5) Cross-border or diversifying (3) vs large CAPX (1, base)	(6) *DB_Cover*
Model	Logit	Logit	Logit	Multinomial logit		OLS
iUnion						0.602***
						(0.082)
ln(1+*Age*)						0.143***
						(0.007)
DB_Cover (*Inst.*)	1.763***	1.506***	2.199***	-0.881	1.384***	
	(0.455)	(0.471)	(0.540)	(0.577)	(0.398)	
CashFlow	-0.294	0.179	0.161	-1.147**	-1.043***	
	(0.405)	(0.376)	(0.412)	(0.457)	(0.358)	
Q	0.016	-0.000	-0.001	-0.231***	-0.238***	
	(0.036)	(0.033)	(0.034)	(0.035)	(0.029)	
Size	0.186***	0.075**	0.118***	0.445***	0.565***	
	(0.031)	(0.033)	(0.035)	(0.042)	(0.033)	
Tang	0.917**	-1.103***	-1.058**	-6.544***	-7.759***	
	(0.413)	(0.404)	(0.443)	(0.481)	(0.311)	
WC	1.087***	0.870**	1.041***	-0.564	0.501	
	(0.347)	(0.359)	(0.386)	(0.437)	(0.316)	
Div	-3.739	0.633	0.889	3.182	4.221*	
	(2.647)	(2.949)	(3.089)	(3.370)	(2.245)	
CumRet	0.133*	0.011	0.042	-0.127	-0.092*	
	(0.069)	(0.071)	(0.080)	(0.079)	(0.049)	
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-sq	0.091	0.090	0.094	0.137		
Adjusted R-sq						0.270
N	27,883	27,883	27,883	27,883		27,883

Table 6 Change in pension expense around major investment

Outcome equation:

$$\Delta(Pen/Emp)_{t,t+2} = \gamma_0 + \gamma_1 Q_t + \gamma_2 Size_t + \gamma_3 TDB_t + \gamma_4 DB\_Cover_t + \gamma_5 Treat_{t+1} + \gamma_6 DB\_Cover_t \times Treat_{t+1} + \sum_{i=1991}^{2013} \gamma_{yr,i} Yrdum_{i,t} + \sum_{j=21}^{39} \gamma_{ind,j} SIC2_{j,t} + \varepsilon_t$$

Treatment equation:

$$Treat_{t+1} = 1 \; if \; \alpha_0 + \alpha_1 DB\_Cover_t + \alpha_2 CashFlow_t + \alpha_3 Q_t + \alpha_4 Size_t + \alpha_5 Tang_t + \alpha_6 WC_t + \alpha_7 Div_t + \alpha_8 CumRet_t + \sum_{i=1991}^{2013} \alpha_{yr,i} Yrdum_{i,t} + \sum_{j=21}^{39} \alpha_{ind,j} SIC2_{j,t} + u_t > 0;$$

0 otherwise

The dependent variable, $\Delta(Pen/Emp)_{t,t+2}$, is change in pension expense per employee from *t* to *t*+2. Regressions are estimated with treatment-effect model, with the outcome results reported in Panel A and the treatment equation results reported in Panel B. In column 1, the treatment (*Treat*) is large capital expenditure (*LargeCAPX*), defined as capital expenditure-to-assets ratio above 90th percentile of sample firms in the year. In column 2, the treatment is acquisition (*Acquire*). In column 3&4, the treatment is cross-border or diversifying acquisition (*CrossBorder-Diversify*). All explanatory variables are defined in Table 1 and are measured as of time *t*.

Models in columns 1&2 are estimated with all sample firms, and model in column 3&4 are estimated for firms making large investments only, i.e. *LargeCAPX* = 1 or *Acquire* = 1. In column 4, *DB_Cover* is instrumented by *ln*(1+*Age*) and *iUnion*, together with year dummies and dummies for 2-digit SIC industries. Year dummies and dummies for 2-digit SIC industries are added but not reported. The standard errors are reported in the parentheses. *,**,*** represent 10%, 5% and 1% significant levels respectively.

Panel A	(1)	(2)	(3)	(4)
Sample	Full	Full	*LargeCAPX* = 1 or *Acquire* = 1	*LargeCAPX* = 1 or *Acquire* = 1
DB_Cover instrumented?	No	No	No	Yes
Q	0.002	0.015*	0.013	0.010
	(0.008)	(0.008)	(0.014)	(0.015)
Size	0.033***	0.056***	0.034**	0.044***
	(0.006)	(0.010)	(0.016)	(0.017)
TDB	0.045	0.018	-0.113	-0.067
	(0.042)	(0.042)	(0.106)	(0.105)
DB_Cover	0.160***	0.177***	0.369***	0.384
	(0.035)	(0.035)	(0.110)	(0.244)
LargeCAPX	0.263**			
× *DB_Cover*	(0.109)			
LargeCAPX	0.089			
	(0.083)			
Acquire		-0.113		
× *DB_Cover*		(0.091)		
Acquire		-0.523***		
		(0.191)		

CrossBorder-Diversify × *DB_Cover*			-0.399***	-0.832***
			(0.139)	(0.288)
CrossBorder-Diversify			-0.016	0.061
			(0.122)	(0.131)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes

Panel B	(1)	(2)	(3)	(4)
Treatment	*LargeCAPX*	*Acquire*	*CrossBorder-Diversify*	*CrossBorder-Diversify*
DB_Cover	-0.450***	-0.094**	0.459***	1.039***
	(0.055)	(0.047)	(0.090)	(0.230)
CashFlow	1.369***	0.780***	-0.290*	-0.317*
	(0.103)	(0.107)	(0.176)	(0.176)
Q	0.212***	0.058***	-0.107***	-0.103***
	(0.011)	(0.011)	(0.018)	(0.019)
Size	-0.090***	0.217***	0.297***	0.295***
	(0.010)	(0.009)	(0.016)	(0.016)
Tang	3.664***	-0.797***	-3.769***	-3.789***
	(0.105)	(0.106)	(0.183)	(0.183)
WC	-0.199*	0.017	0.749***	0.711***
	(0.110)	(0.102)	(0.194)	(0.195)
Div	-4.294***	-0.619	3.146**	2.481*
	(0.763)	(0.701)	(1.225)	(1.270)
CumRet	0.157***	0.059***	-0.077**	-0.077**
	(0.022)	(0.022)	(0.038)	(0.038)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
lambda	-0.020	0.214**	-0.081	-0.073
	(0.046)	(0.100)	(0.075)	(0.075)
Wald chi-2	2047.51***	1902.34***	1089.29***	1079.76***
N	20,806	20,806	4,163	4,163

Table 7 Change in operating performance around major investment

Outcome equation:

$$\Delta(EBITD/Asset)_{t,t+2} = \gamma_0 + \gamma_1 Q_t + \gamma_2 Size_t + \gamma_3 TDB_t + \gamma_4 DB\_Cover_t + \gamma_5 Treat_{t+1} + \gamma_6 DB\_Cover_t \times Treat_{t+1} + \sum_{i=1991}^{2013} \gamma_{yr,i} Yrdum_{i,t} + \sum_{j=21}^{39} \gamma_{ind,j} SIC2_{j,t} + \varepsilon_t$$

Treatment equation:

$$Treat_{t+1} = 1 \; if \; \alpha_0 + \alpha_1 DB\_Cover_t + \alpha_2 CashFlow_t + \alpha_3 Q_t + \alpha_4 Size_t + \alpha_5 Tang_t + \alpha_6 WC_t + \alpha_7 Div_t + \alpha_8 CumRet_t + \sum_{i=1991}^{2013} \alpha_{yr,i} Yrdum_{i,t} + \sum_{j=21}^{39} \alpha_{ind,j} SIC2_{j,t} + u_t > 0;$$

0 otherwise

The dependent variable, $\Delta(EBITD/Asset)_{t,t+2}$, is change in earnings before interest, taxes and depreciation, scaled by lagged total assets, from *t* to *t*+2. Regressions are estimated with treatment-effect model, with the outcome results reported in Panel A and the treatment results reported in Panel B. In column 1, the treatment (*Treat*) is large capital expenditure (*LargeCAPX*), defined as capital expenditure-to-assets ratio above 90th percentile of sample firms in the year. In column 2, the treatment is acquisition (*Acquire*). In column 3&4, the treatment is cross-border or diversifying acquisition (*CrossBorder-Diversify*). All explanatory variables are defined in Table 1 and are measured as of time *t*.

Models in columns 1&2 are estimated with all sample firms, and model in column 3&4 are estimated for firms making large investments only, i.e. *LargeCAPX* = 1 or *Acquire* = 1. In column 4, *DB_Cover* is instrumented by *ln*(1+*Age*) and *iUnion*, together with year dummies and dummies for 2-digit SIC industries. Year dummies and dummies for 2-digit SIC industries are added but not reported. The standard errors are reported in the parentheses. *,**,*** represent 10%, 5% and 1% significant levels respectively.

Panel A	(1)	(2)	(3)	(4)
Sample	Full	Full	*LargeCAPX* = 1 or *Acquire* = 1	*LargeCAPX* = 1 or *Acquire* = 1
DB_Cover instrumented?	No	No	No	Yes
Q	-0.001**	0.002**	-0.006***	-0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
Size	-0.004***	0.013***	-0.004***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
TDB	0.062***	0.055***	0.071***	0.068***
	(0.004)	(0.004)	(0.010)	(0.009)
DB_Cover	0.001	-0.007*	-0.010	0.015
	(0.003)	(0.004)	(0.010)	(0.022)
LargeCAPX	-0.034***			
× *DB_Cover*	(0.010)			
LargeCAPX	-0.085***			
	(0.007)			
Acquire		0.037***		
× *DB_Cover*		(0.007)		
Acquire		-0.395***		
		(0.018)		

CrossBorder-Diversify			0.035***	0.084***
× DB_Cover			(0.013)	(0.026)
CrossBorder-Diversify			-0.014	-0.019
			(0.011)	(0.012)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes

Panel B	(1)	(2)	(3)	(4)
Treatment	*LargeCAPX*	*Acquire*	*CrossBorder-Diversify*	*CrossBorder-Diversify*
DB_Cover	-0.506***	-0.094**	0.562***	1.135***
	(0.052)	(0.044)	(0.084)	(0.208)
CashFlow	1.345***	0.714***	-0.343**	-0.371**
	(0.089)	(0.091)	(0.150)	(0.150)
Q	0.214***	0.055***	-0.110***	-0.107***
	(0.009)	(0.010)	(0.016)	(0.016)
Size	-0.074***	0.214***	0.272***	0.272***
	(0.009)	(0.008)	(0.014)	(0.014)
Tang	3.675***	-0.873***	-3.894***	-3.925***
	(0.094)	(0.097)	(0.166)	(0.166)
WC	-0.143	-0.053	0.590***	0.534***
	(0.098)	(0.092)	(0.174)	(0.175)
Div	-4.299***	-0.831	3.374***	2.786**
	(0.692)	(0.647)	(1.120)	(1.158)
CumRet	0.150***	0.060***	-0.052	-0.052
	(0.019)	(0.020)	(0.034)	(0.034)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
lambda	0.047***	0.203***	0.005	0.002
	(0.004)	(0.009)	(0.007)	(0.007)
Wald chi-2	2432.01***	2141.66***	1290.26***	1289.85***
N	25,117	25,117	5,044	5,044

Table 8 Robustness check: DB plans, type of acquisition, and post-acquisition pension expense and operating performance

Panel A reports the multinomial logit regression for the choice between large capital expenditure and different types of acquisition. The dependent variable is an indicator that equals zero (0) if a firm neither makes large capital expenditure nor completes an acquisition at t+1, one (1) if a firm makes a large capital expenditure but does not complete an acquisition at t+1, two (2) if a firm completes at least one domestic horizontal acquisition but no cross-border or diversifying acquisition at t+1, and three (3) if a firm completes at least one cross-border or diversifying acquisition at t+1. Case (1) as the base case. Result for case (2) versus case (1) is reported in column 1 and result for case (3) versus case (1) is reported in column 2.

Panel B reports the regressions for changes in per-capita pension expense and operating performance and the models are defined similarly to those in column 3 of Tables 6 & 7. The result for treatment model is not reported for saving space.

Industry's share of import (export) is defined as its import (export) value divided by the total import (export) value. After-interest marginal tax rate comes from Blouin, Core and Guay (2010). Intensity of cross-border (diversifying) acquisitions is the number of cross-border (diversifying) acquisitions divided by the total number of acquisitions in the industry. Dedicated (Transient) ownership is the number of shares held by dedicated (transient) investors divided by the total number of shares outstanding. *DB_Cover*, *CashFlow*, *Q*, *Size*, *Tang*, *WC*, *Div*, and *CumRet* are defined in Table 1 and are measured as of time *t*. Year dummies and dummies for 2-digit SIC industries are added but not reported. The standard errors are reported in the parentheses. *,**,*** represent 10%, 5% and 1% significant levels respectively.

Panel A Investment choice	(1) No major investment (0) vs large CAPX (1, base)	(2) Domestic horizontal (2) vs large CAPX (1, base)	(3) Cross-border or diversifying (3) vs large CAPX (1, base)
DB_Cover	0.881***	0.281	0.771***
	(0.159)	(0.269)	(0.185)
CashFlow	-1.878***	-1.005*	-0.606
	(0.316)	(0.514)	(0.399)
Q	-0.351***	-0.212***	-0.202***
	(0.025)	(0.038)	(0.031)
Size	0.214***	0.441***	0.617***
	(0.036)	(0.053)	(0.042)
Tang	-6.828***	-7.101***	-8.008***
	(0.260)	(0.533)	(0.337)
WC	0.345	-0.420	0.473
	(0.307)	(0.481)	(0.351)
Div	4.860**	1.086	3.453
	(2.010)	(3.642)	(2.504)
CumRet	-0.285***	-0.201**	-0.115**
	(0.039)	(0.086)	(0.053)
Industry's share of import	-4.432	-16.222*	-0.207
	(4.482)	(9.544)	(5.083)
Industry's share of export	-9.225**	19.998**	-11.257**
	(4.494)	(7.960)	(5.036)
After-interest marginal tax rate	-1.904***	-0.096	-0.842
	(0.453)	(0.815)	(0.586)
Intensity of cross-border acquisitions	0.649***	0.161	0.994***
	(0.245)	(0.517)	(0.313)
Intensity of diversifying acquisitions	-0.219	-1.489***	0.238
	(0.188)	(0.354)	(0.272)
Dedicated ownership	0.066	-0.011	-0.953*
	(0.426)	(0.773)	(0.533)
Transient ownership	-2.126***	-0.443	-1.046**
	(0.362)	(0.598)	(0.464)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Pseudo R-sq		0.144	
N		24,364	

Panel B Changes in pension expense and operating performance	(1)	(2)
Sample	*LargeCAPX* = 1 or *Acquire* = 1	*LargeCAPX* = 1 or *Acquire* = 1
Dependent variable	$\Delta(Pen/Emp)_{t,t+2}$	$\Delta(EBITD/Asset)_{t,t+2}$
Q	0.011	-0.006***
	(0.015)	(0.001)
Size	0.044***	-0.004***
	(0.017)	(0.001)
TDB	-0.151	0.066***
	(0.111)	(0.010)
DB_Cover	0.669*	-0.080**
	(0.391)	(0.036)
CrossBorder-Diversify	-0.398***	0.034**
× DB_Cover	(0.148)	(0.014)
CrossBorder-Diversify	-0.076	-0.012
	(0.126)	(0.011)
Intensity of cross-border acq.	-0.191	-0.045*
	(0.296)	(0.027)
Intensity of cross-border acq.	0.048	0.116**
× DB_Cover	(0.601)	(0.057)
Intensity of diversifying acq.	0.376	-0.018
	(0.255)	(0.023)
Intensity of diversifying acq.	-0.506	0.064
× DB_Cover	(0.514)	(0.048)
Year dummies	Yes	Yes
Industry dummies	Yes	Yes
lambda	-0.054	0.003
	(0.078)	(0.007)
Wald chi-2	872.78	1032.50
N	3,760	4,560