ADVANCES IN PACIFIC BASIN BUSINESS, ECONOMICS AND FINANCE

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Dr. Cheng-Few Lee and Dr. Min-Teh Yu

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CORPORATE PENSION FUNDING AND INVESTMENTS: EVIDENCE FROM ASIA PACIFIC COUNTRIES*

Yong H. Kim[a], Bochen Li[b], Miyoun Paek[c] and Tong Yu[d]

ABSTRACT

We study the potential effects of pension underfunding on corporate investment, financial constraints and improved employee bonding using 10 Pacific-Basin countries (including the United States, Australia, and eight Asian countries) at heterogeneous economic development stages and different regulatory environments. We document that corporate pensions are significantly *underfunded in most countries of our sample in the period of 2001–2017, when interest rates were ultralow in most countries. In addition, firms from countries with stronger employee protection and more generous retirement benefits tend to show higher levels of underfunding in their defined benefit (DB) pension plans. To the extent of pension underfunding imposing constraints on corporate investment, we find that firms in these countries can face more constraints on investment when their pension is underfunded.*

Keywords: Defined benefit (DB) pensions; pension underfunding; corporate investment; employee bonding; labor law; underfunding

JEL Classification: G30; G31; J32; J50

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1. INTRODUCTION

Defined benefit (DB) pensions are an important source of private saving and retirement income for employees, and thus many firms around the world continue to sponsor DB pension plans despite the popularity (and flexibility) of defined contribution (DC) retirement plans. Companies with DB pension plans promise their employees certain retirement pension benefit (PB) payment. DC plans work differently from DB plans, and they resemble ordinary savings accounts. The firm deposits a share of wages (or profits) into the accounts each year; after a short vesting period (usually 1 to 3 years), the account then belongs to the worker. In contrast, DB pensions involve no deposits or accounts and as such have lower degree of portability.[1] Still, government rules state that companies must make contributions to their pension funds to meet their future pension liabilities according to legally specified formulas.

With a DB pension plan, the firm pledges retirement benefits to employees determined by each employee's age, tenure, and salary at retirement, etc. Sponsored pension plans are therefore considered an important component of firms' liabilities. In the United States, firms hold the responsibility to assure their pension plans to be fully or nearly fully funded (see Section 3.2 for details). Several studies (e.g., Rauh, 2006) present empirical evidence on the economic costs of pension *underfunding* in the United States. From this perspective, DB plans become a burden to sponsoring firms.[2] There is nevertheless a potential positive role of (underfunded) DB pensions as employees defer a significant portion of their compensation upon their retirement. Treynor (1976) and Ippolito (1985a, 1985b) bring up the implicit contract theory of pension that workers anticipating long careers with a firm will consider the package of wage and PBs they expect to collect over their life cycle. Under this framework, workers in pension plans have incentives to remain with the firm because workers expect to "get more" from their pension plan.[3] This helps "bond" employees with the firm, offering strong incentives for workers to complete the normal tenure in the firm and not quit early. Specifically, these incentives are particularly relevant in contexts with unionized employees, who often negotiate collectively for benefits like pensions. In such scenarios, the underfunding of pensions can become a strategic tool in corporate-union negotiations. Part of the costs to make pensions fully funded are, therefore, rooted in the dynamics of this 'hold-up problem' among unionized employees. Corporates may use pension underfunding as a bargaining chip against unionized workers. Recent studies offer support for this argument.[4] Some recent studies offer support for this argument. For example, using a unique dataset of airlines, Benmelech et al. (2012) show that firms in their sample obtain wage concessions from their employees whose pension plans are underfunded. In other words, management can employ the threat of "pension dumping" to gain extra power in negotiations with employees. Also, Chang et al. (2021) show that pension underfunding plays a positive role in firms' acquisitions. That is, acquirers with larger pension underfunding experience higher announcement returns, and they are more likely to experience an improvement in labor productivity and less likely to become a target post acquisition.

As countries differ in their legal and economic status, a study examining pension funding around the world will help us understand and differentiate the

alternative drivers for corporate pension funding. For instance, according to Ippolito's implicit contract theory, we expect to observe higher levels of pension underfunding in countries with stronger employee protections such as union power, and this can provide employees with stronger incentives to work hard and create value for the firm. Nonetheless, there is a tradeoff. That is, severe underfunding can also cause firm's underinvestment, among other financial constraints, if firms may not easily find external financing.

In this study, we examine the use of corporate pension in 10 Pacific-Basin countries (including the United States, Australia, and eight Asian countries). With this diverse sample, we can take advantage of the substantial heterogeneity across countries in terms of corporate legal environment, regulations, and economic conditions. We expect that factors like a country's labor laws and the presence of influence of labor unions have an impact on the funding status of corporate pension and the economic consequence of pension underfunding. We particularly focus on three questions regarding corporate pensions. The first is on funding status in an international setting. In other words, are they in general underfunded? And if yes, by how much? Second, we are interested in the cross-country heterogeneity of pension funding status. For example, are corporate pensions more likely to be underfunded in countries with stronger or weaker labor power, among other factors? Last but not least, we investigate the effect of pension funding on corporate investment in the international market and what determines the cross-country heterogeneity. Potential candidates of such determinants include labor laws and policies as well as conditions of the financial market.

Our main findings are as follows. First, corporate pensions are significantly underfunded in most countries of our sample in the period from 2001 to 2017. Second, firms from countries with stronger employee power and more generous retirement benefit as well as more developed credit markets tend to show higher levels of underfunding in their DB pension plans. Finally, corporate pension underfunding appears to impose constraints on corporate investment. To the extent of pension underfunding effect on corporate investment, we find that capital investment of firms in countries that offer more power to the employees and more generous retirement benefits is more sensitive to pension underfunding, potentially indicating that firms in these countries face more constraints on corporate investment when their pension is underfunded.

One of the key benefits of DB retirement plans is that they provide individuals with a form of insurance against the uncertainty of their life expectancy. DB plans offer a guaranteed income stream during retirement that is typically based on factors such as years of service and salary history.[5] Indeed, the literature has shown significant interest in the optimal design of retirement plans and corporate pension funding. The challenge lies in striking a balance between offering an optimal level of protection for individuals and minimizing the financial burden on corporations. Our study contributes to literature on several grounds. First, pension underfunding has been a trending topic in recent years because it has been reportedly severe in both public and private sector in the United States as well as globally. Since the 2008 global financial crisis, and until very recently, most countries have lowered interest rates to ease corporate financing and boost investment. One of the by-products of low interest rate in the pension context is

that it increases the present value of projected benefits obligations for DB pension plans. Even worse, if pension plans' investments experience weak performance due to the condition of the equity market, the assets of firms' pension plans would not be able to keep up with the increase in the liabilities, and underfunding will become more severe. Although anecdotal evidence shows that pension underfunding is a global issue, empirical evidence in the global market is relatively scarce (OECD, 2019), especially in emerging economies in the Pacific-Basin region. We attempt to fill this gap and contribute to the pension literature by studying international pension underfunding in a systematic way. More importantly, we attempt to study private pension funding across countries and identify legal and financial environment characteristics that have impacts on funding levels.

Last but not least, underfunding will generate the condition of financial constraint, and, in turn, it highlights the impact of financial constraint on corporate investment, one of the central topics in modern corporate finance. Starting from Fazzari et al. (1988), many papers have documented that various firm characteristics (e.g., Almeida & Campello, 2007; Hadlock & Pierce, 2010) and exogenous shocks (e.g., Duchin et al., 2010; Lamont, 1997) can lead to higher financial constraint and thus lower investment. Specifically in the context of the effect of pension funding status on corporate investment, Rauh (2006) documents that firms' mandatory contributions to the pension plans they sponsor have negative impact on their capital expenditures, and the effect is stronger among firms with otherwise more severe financial constraints. We extend this line of literature by relating it to differences in legal and financial environment such as labor laws, which typically have influence on countries' retirement systems and access to external finance that typically vary significantly across countries. In the context of DB pensions, our study probably most closely relates to Bartram (2017), who also studies the interaction between pension and corporate investment in the international market. He focuses on the concept that a company's DB pension can function as a source of funding because it is more flexible than traditional debt in terms of payment. Bartram then distinguishes pension's effect on firm's investment between capital expenditures and research and development (R&D) spending due to their differences in adjustment costs. The paper further studies this concept using countries' financial market development data and documents that R&D-intense firms rely more on their pensions in countries with less developed financial markets while CapEx-intense firms rely less on pensions. We differ from Bartram (2017) in that we focus on *pension underfunding* instead of *pension size*, and through the channel of pension underfunding, we add evidence to the effect of various country characteristics on corporate investment, such as labor-related legislations and regulations and external financial markets.

Granted, one of the main reasons for pension underfunding is the global ultralow interest rates over our sample period. Should interest rates rise, it is crucial to recognize that the dynamics of DB pensions and their associated costs and benefits could undergo significant changes. For example, higher interest rates would lower the present value of future pension obligations, potentially reducing the funding gaps in underfunded plans or even resulting in a pension surplus

(Wadia, 2022). The potential impact of rising interest rates on DB pensions extends beyond the scope of our current study and warrants future research.

The remainder of the paper is organized as follows. Section 2 introduces potential causes and outcomes of pension underfunding. Section 3 develops the main hypotheses in this study. Section 4 describes the data and the construction of our sample. In Section 5, we provide empirical evidence on corporate pension funding in international markets and test our hypotheses in detail by analyzing the relation between the effect of pension underfunding on firm's investment and various country characteristics. Section 6 concludes the paper.

2. CAUSES AND OUTCOMES OF PENSION UNDERFUNDING

Pension funding status is a key concept in pension studies, and it is defined as the difference between pension assets and pension liabilities. Pension assets are mainly shifted by market values of the equity and fixed income assets that firms select to invest in in order to fund pension liabilities, as well as potential variation in the amount of cash that firms contribute. Pension liabilities move closely with interest rate, and the relationship is inverse. When the market value of pension assets is greater than the present value of projected pension liabilities, the pension plan is overfunded, and firms do not have to make contributions to their pension funds. Actually, if the pension plan is overfunded and the firm still makes contributions to its pension plans, it may not receive favorable tax treatment. When the value of pension assets is below the value of projected future pension obligations, the pension plan is underfunded.

Therefore, pension funding status can be affected by many factors that are out of the control of the firm, such as capital market performance and interest rate level, as well as factors that can be controlled to some extent by the firm, such as pension assets' expected rate of return, and firms' contributions. When a country's equity and bond markets perform well, and/or its interest rate level is high, pension plans in this country are more likely to be well funded. When managers make abundant contributions to firms' pension plans, they also tend to be better funded. According to Bartram (2018), DB pension plans are smaller and funding levels lower for plan sponsors that have less cash are less profitable and are financially distressed in the United States. In sum, pension underfunding potentially has both direct (investment) and indirect (stock performance) negative impact on firm's investment, financing, and thus its growth.

On the flip side, Ippolito (1985a) brings up in his seminal paper on the implicit contract theory of pension underfunding. That is, workers anticipating careers with a firm will consider the package of wage and PBs they expect to collect over their life cycle. Following the notation in Ippolito (1985a, 1985b), we consider a simple case where a worker starts with the firm at age zero. For an employee with A years of service to date, the firm could project the employee's PB P_A as:

$$P_A = gAW(R)e^{-i(R-A)} \tag{1}$$

where A is the employee's years of service, R is the retirement age, i is the discount rate, $W(R)$ is the final wage, and g is generosity parameter, determining the percentage of salary the employee can get upon retirement. However, if an employee terminates the employment at age A, the termination PB is[6]:

$$P_T = gAW(A)e^{-i(R-A)} \tag{2}$$

It is clear that $P_A > P_T$. As a result, a unique feature of pension is its ability to retain employees.

Since DB PB is significantly greater for an employee working with a firm for a longer time, employees with DB pension have stronger incentives to stay with a firm. In contrast, as DC retirement plans do not specify the amount of benefit accrued to employees, DC retirement plans would not have the retention benefit as DB pensions do.

In addition, pension may act as a costly bonding device to align the interests of firms and employees. This offers a vital role of pension plans in a modern society where a significant portion of employers has switched their retirement plans to DC plans. Suppose the formula for PB is:

$$PB = baW_j \tag{3}$$

where b is generosity parameter, a is employee age, and W_j is wage at age j. As a result, accumulated PB is:

$$PV_a = \int_{j=a}^{R} baW_j f_{ja} e^{-i(R-a)} dj \tag{4}$$

where f_{ja} is the conditional probability density of pension accruals stopping either because the individual leaves the firm or the firm terminates the pension at age j, given that the individual is currently age a.[7]

Suppose the pension contract is incomplete and thus ineffectual in adequately controlling employees' effort levels. This inadequacy can heighten the firm's default risk, subsequently elevating the likelihood of premature pension termination.

An effective way to reduce the low effort level problem is to underfund the pension project. Assume the above pension plan is partially funded with a funding ratio δ^* (<1), then:

$$F_A = \delta^* P_A \tag{5}$$

If the employee fails to work diligently, and thus the firm goes bankrupt, the employee can only receive $\delta^* P_A$ for her retirement benefit at retirement. As a result of this threat, the employee is motivated to work with the employer to avoid bankruptcy. This is the so-called bonding mechanism of underfunded

pension.[8] When there is a labor hold-up problem given the presence of labor union, it is ideal for the firm to underfund the pension. This imposes a potential cost on employees when they force the firm into bankruptcy.

In sum, the level of corporate DB pension underfunding generally reflects pension funds' investment outcomes, the amount of pension liabilities promised by the firm, and the interest rate levels. It also potentially reflects the benefits of promoting employee productivity, known as bonding.

Since the 2008 global financial crisis, most countries have lowered interest rates to ease corporate financing and boost investing. However, one of the by-products of low interest rate in the pension context is that it mechanically increases the present value of projected benefits obligations for DB pension plans. Even worse, if pension plans' investments experience weak performance due to the condition of the equity market, the assets of firms' pension plans would not be able to keep up with the increase in the liabilities, giving firm's pension funding status a double whammy. This could in turn limit investment and thus to some degree act against stimulations.

In the United States, for example, DB pension funds in general have been underfunded for years since the financial crisis. According to the Federal Reserve (2022), private and public pension funds in the United States in total are underfunded by hundreds of billions of dollars (e.g., 623 billion in 2022) and trillions of dollars, respectively. Anecdotal evidence also points to the same direction. According to a *Wall Street Journal* article by Monga (2016), "The combined pension deficit for S&P 1500 companies ballooned to $568 billion at the end of June, a $164 billion increase from the end of 2015." Following the unfavorable situation and uncertainty involved in DB pension plans that companies need to bear, many firms offering DB pension plans chose to freeze their DB plans for their new employees and instead offer DC plans. FedEx and General Electric are the two recent examples in the United States to freeze their DB pensions. The underfunding situation in the public sector is even worse, both at the Federal level and the State and Local level. Funding levels of many US states such as New Jersey and Illinois are under substantial stress. An extreme case is that Puerto Rico's pension plans reportedly have $45 billion in liabilities but only $2 billion in assets.[9]

3. HYPOTHESES DEVELOPMENT

3.1 Pension Funding

Given that private DB pension plans are adopted globally and that the economic conditions (e.g., the 2008 financial crisis) are intertwined across countries thanks to globalization, it is natural to ask whether private pension funds experience similarly severe underfunding in other countries in the Pacific-Basin region. Since we observe internationally a low level of interest rate and capital market performance in general, we expect to see a similar picture of funding status in the Pacific-Basin region in general as in the United States. Therefore, our first testable hypothesis is:

H1 (International underfunding hypothesis). Pension underfunding is present in the rest of the Pacific-Basin region.

3.2 Country Characteristics

Also, the corporate DB pension underfunding can also be impacted by external business and legal environments. In this subsection, we describe our main hypotheses on how corporate pension funding status and the effect of pension underfunding on firms' investment activities can be different across Pacific-Basin countries in our sample. This cross-country analysis is one of the main novelties in our study since most earlier research on the financial constraint effect of pension underfunding on firm investment is within a single country (e.g., Rauh, 2006).

Our main country's characteristics belong to labor laws and policies. In addition, the industry effect and economy in general are also part of our consideration. One thing worth mentioning is that in the law and finance literature, most studies investigate how different countries' laws and institutions vary in protecting investors' rights, especially for the minority stakeholders, and such protection can in turn influence firms' investing and financing activities. A vast majority of the research in this area points out that English Common Law system appears to dominate continental European Civil Law systems in terms of protecting small investors, allocating resources efficiently, and enhancing financial market development (e.g., Brockman & Unlu, 2009; Djankov et al., 2008; La Porta et al., 1998, etc.). In this study, however, we investigate laws and institutions that protect employees instead of investors, specifically from the perspective of their retirement savings. One important source of such variation is the regulation of labor markets. For example, Botero et al. (2004) find significant variation in labor laws including Employment Laws and Social Security Laws among countries with different ideologies and legal systems. Such heterogeneity in labor laws can drive cross-country variations in pension design, causing differential pension funding status and relationships between pension funding status and firm investment. More recently, Banker et al. (2013) and Simintzi et al. (2015) document that employment protection legislations have important influence on firms' labor adjustment costs and capital structure, respectively.

Furthermore, we expect that heterogeneity in country characteristics leads to differences in the status of pension underfunding across countries. Following our discussion in Section 2 regarding the advantages (employee bonding) and disadvantages (financial distress) of pension underfunding, we posit that labor-related laws and policies can have effects on pension underfunding. Specifically, one could argue that in a country with stronger employee protection and more generous retirement system in general, DB pension plans should be better funded because retirement funds are considered one of the most important rights of employees, and therefore properly funding their pension funds is treated with higher priority in firms' business. Indeed, cross-country heterogeneity mentioned in Laboul and Yermo (2006) include that "Anglo-Saxon countries have generally allowed a much greater degree of involvement of employers in the administration