

Company Characteristics and Adoption of Defined-Contribution Pension Plans in Japan

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Abstract

This paper investigates characteristics of Japanese companies that adopted defined-contribution pension plans (DC plans) between October 2001 and July 2011. Unlike previous studies, our investigation spanned three phases—introduction, growth, and review—during the evolution of DC plans in Japan. Results show that companies with large numbers of employees adopted DC plans during the introduction phase (October 2001–July 2004). Companies that adopted DC plans during the growth phase (August 2004–August 2007) had more unfunded pension obligations. Companies with fewer employees adopted DC plans during the review phase (September 2007–July 2011).

Keywords: defined-contribution pension plans, decision-making, corporate pension plan

1. Introduction

Defined-contribution pension plans (DC plans) are corporate-sponsored retirement vehicles. Employers contribute a percentage of employees' salaries, and employees can match the company's contributions. Employees direct both contributions into financial accounts offered by their employer through professional investment firms. Investment returns grow untaxed until the employee retires. Japan legislated for DC plans in October 2001, and the number of participating employees has increased yearly, exceeding one million in 2004 and 4,650,000 at the end of 2013. The number of Japanese companies that adopted DC plans reached 17,872 on January 31, 2014.

Japan has instituted several changes in its DC program since 2011. In 2011, employees were allowed to match company's contributions and employers were required to sponsor

investment education. The upper limit on contributions is scheduled to be lifted in 2014. Alongside implementation and revisions to DC plans, circumstances surrounding corporate pension plans also changed. A retirement benefit accounting system was reviewed in 2007, and tax-qualified retirement pension plans were abolished in 2012. In this way, Japan changed the availability of existing pension plan.

Several studies have examined the spread of DC plans in the US after a introduction of tax breaks in 1986, including Dorsey (1987), Stone (1987, 1991), Gustman and Steinmeier (1992), Ippolito (1995), and Mitchell and Dykes (2003). Dorsey (1987) observed that companies opting for DB plans are large, unionized, and pay lower wages. Stone (1987) argued that companies choose DC plans to avoid reporting about their underfunded pension reserves. Stone (1991) noted that unprofitable companies choose DC plans.

Gustman and Steinmeier (1992) indicated that a shift from DB to DC is triggered by the change in the company constitution, including industry and corporate scale, and presence of labor union. Ippolito (1995) identified a shift to DC plans among employees transferring from manufacturing to non-manufacturing industries. Mitchell and Dykes (2003) determined that changes in the size of their workforce and in personnel strategies prompt companies to shift from DB to DC plans.

In addition, several studies have examined employees' choice of corporate pension plans. Brown and Weisbenner (2007) concluded that employees lacking financial literacy choose DB plans and more financially literate employees choose DC plans. According to Cocco and Lopes (2011), employees who expect their incomes to rise choose DB plans, whereas those uncertain about their future income choose DC plans.

Kan (2007), Yoshida (2009), and Yoshida and Horiba (2012) investigated the factors underlying Japanese companies' adoption of DC plans after the mid-2000s. Kan (2007) used a questionnaire survey in 2006, when the system was five years old, to analyze why medium-sized and small businesses adopted DC plans. He found that companies adopt DC plans when their scale is expanding and the average tenure of employees' service is rising. Analyzing corporations listed on the first section of the Tokyo Stock Exchange (TSE) at fiscal year-end March 2006, Yoshida (2009) observed that companies are more likely to adopt DC plans if liabilities in their existing DB plans are increasing, if their employees are generally younger, and if their operating scale is expanding. However, debt ratios, cash flow volatility, ordinary profit rate, unionization, and turnover were unrelated to the adoption of DC plans. Using March 2005 data for Japanese companies, Yoshida and Horiba (2012) observed that an

increase in company size and the extent to which their existing DB pensions are underfunded drive the adoption of DC plans.

Previous studies have shown that companies' adoption of DC plans is associated with the adequacy of funding for their existing DB plans earnings, average age of employees, unionization, company scale, employee turnover, and wages. However, previous studies analyzed adoption of DC plans only at specific points in time. No previous research has asked "during what stages following nationwide establishment of DC plans do companies initiate their DC plans?" Answering this question concerning Japanese companies is this study's first contribution to existing literature.

Using data for 1,884 companies listed on the first section of the TSE from 2001 to 2011, we investigate whether four firm-specific characteristics are associated with adoption of DC plans. We then divide the history of Japan's DC system into three stages and compare firm-specific characteristics associated with adopting a DC plan during different stages. Clarifying the characteristics of companies that adopt DC plans and the stages at which they do so provides necessary information about the diffusion of DC plans throughout Japan and provides this study's second contribution to existing literature.

This study proceeds as follows. Section2 develops major hypotheses and describes data. Section3 reports empirical results. Section4 concludes.

2. Hypotheses and data

2.1 Hypotheses

We first specify firm-specific characteristics of Japanese companies that might be associated with adopting a DC plan. Following Yoshida and Horiba (2012), we identified those characteristics in relation to companies' operating factors and risks. Table 2-1 describes seven operating factors: company's scale, industry type, wage, employee turnover, average age of employees, existence of labor association, and adoption of existing DB plans. Table 2-1 also identifies four risk factors: corporate performance, cash flow volatility, underfunded pension liabilities, and retirement benefit obligations. In addition, a country's system of taxation and accounting standards influence adoption of DC plans, and these exogenous considerations are included in Table 2-1.

Table 2-1 Characteristics of DC Adoption

Company Factors	Company's scale, Industry type (manufacturing industry or non-manufacturing industry), Wage, Turnover, Average age of employees, Existence of labor association, Adoption of existing DB plans
Risk Factors	Corporate performance, Cash flow volatility, Underfunded pension liabilities, Retirement benefit obligations
System Factors	Degree of DC development, Taxation system, Accounting standards

This study examines company scale, corporate performance, and underfunded pension liabilities, as characteristics related to adopting DC plans during each stage of the evolution of DC plans in Japan. The effect of these factors on adopting DC plans differs in the US and Japan. It is the difference in DC systems between Japan and the US and is generally thought as the reason why analysis in Japan is different from that in the US. For example, US companies adopt DC plans to avoid disclosing underfunded pension reserves in their financial statements, but Japanese companies must eliminate any such shortfalls when they shift to DC plans. However, we surmise that the stage of the DC system's development influences companies' adoption of DC plans. For example, large companies adopt DC plans soon after a DC pension plan is introduced, followed by medium-sized and small business.

We investigate three hypotheses.

Hypothesis 1 The relation between a company's scale and its adoption of a DC plan varies during different stages in the evolution of DC plans in Japan.

Hypothesis 2 The relation between corporate performance and adoption of a DC plan varies during different stages in the evolution of DC plans in Japan.

Hypothesis 3 The relation between underfunded pension liabilities and adoption of a DC plan varies during different stages in the evolution of DC plans in Japan.

We use cash flow volatility to examine in detail the relation between a risk factor and adoption of DC plans. We seek to verify a fourth hypothesis.

Table 2-2 Stages of DC Plan Development

Development Stage	Period	Main Events during the Period
DC Introduction	October 2001 to July 2004	DC introduction Participants exceed 1 million
DC Growth	August 2004 to August 2007	Review agreement of retirement benefit accounting system
DC Review	September 2007 to July 2011	Matching contribution introduction Mandatory investment education

Hypothesis 4 The relation between cash flow volatility and adoption of DC plans varies during different stages in the evolution of DC plans in Japan.

Table 2-2 indicates historical stages in the nationwide evolution of DC plans in Japan. We stipulate October 2001–July 2004 as the introduction stage, August 2004–August 2007 as the growth stage, and September 2007–July 2011 as the review stage.

2.2 Data

We shortlisted 2,870 non-financial companies from 3,034 listed companies that show details about their retirement benefit accounting on Nikkei NEEDS on July 31, 2011¹⁾. The sampling period spans October 2001 to July 2011. In all, 1,884 companies maintain the data necessary for analysis—607 adopt DC plans and the remaining 1,277 don't. Table 2-3 categorizes the sampled companies into 32 industries and indicates the number of companies that adopt DC plans and don't in every industry.

Table 2-3 Industrial Distribution of Sampled Companies

	DC adoption or not			DC adoption or not	
	Adoption	None		Adoption	None
1 Fisheries	1	7	17 Transportation equipment–n.e.c.	4	8
2 Mining industry	2	2	18 Drugs & Medicines	25	9
3 Ceramics	16	34	19 Manufacturing industries–n.e.c.	23	49
4 Foods	32	67	20 Construction	42	95
5 Textile	17	25	21 Trading company	58	101
6 Paper & Pulp	3	14	22 Real estate	8	24
7 Chemicals	48	115	23 Warehousing	8	27
8 Petroleum	1	5	24 Electricity	10	0
9 Rubber	9	14	25 Gas	1	9
10 Iron & Steel	7	36	26 Railway transport & bus	0	27
11 Non-ferrous metals	15	75	27 Land transportation	4	22
12 Machinery	61	120	28 Marine transportation	0	16
13 Precision instruments	16	18	29 Air transport	2	0
14 Electrical machinery	79	122	30 Communication	5	14
15 Motor vehicles	31	36	31 Retail trade	21	43
16 Shipbuilding	1	5	32 Services	57	138
			Total	607	1277

(Classification of industries by Nikkei)

2.3 Model

To inspect the four hypotheses in Section 2.1, we choose adoption of a DC plan as explained variable and four factors as explanatory variables: pension deficit ratio (underfunded pension liability in percent), cash flow volatility, corporate performance ratio, and company scale (number of employees). We defined each explanatory variable as follows.

Pension deficit ratio (underfunded pension liability in percent)

$$= \frac{\text{Projected benefit obligation (PBO)} - \text{Pension fund}}{\text{PBO}}$$

Cash flow volatility

$$= \frac{\text{Standard deviation of operating cash flows over an 11-year period (2001 through 2011)}}{\text{Absolute value of the mean of the operating cash flows}}$$

$$\text{Corporate performance ratio} = \frac{\text{Current Profit}}{\text{Total Assets}}$$

Company scale = Log of number of employees

We use the log of number of employees as company scale because the maximum number of employees is large and the distribution irregular. Also, companies need time to make decisions, so we generally used the two previous period data for all explanatory variables except cash flow volatility.

We use a Logit model, a qualitative choice model, and estimated the following regressions.

Adoption or non-adoption of DC plans

$$= \beta_1 + \beta_2 \cdot \text{Pension deficit ratio} + \beta_3 \cdot \text{Cash flow volatility} \\ (-) \qquad \qquad \qquad (+) \\ + \beta_4 \cdot \text{Corporate performance ratio} + \beta_5 \cdot \text{Company scale} \\ (+) \qquad \qquad \qquad (-)$$

Adoption or non-adoption of DC plans during each stage in the evolution of DC plans

$$= \beta_1 + \beta_2 \cdot \text{Pension deficit ratio} + \beta_3 \cdot \text{Cash flow volatility} \\ (-) \qquad \qquad \qquad (+) \\ + \beta_4 \cdot \text{Corporate performance ratio} + \beta_5 \cdot \text{Company scale} \\ (+) \qquad \qquad \qquad (-)$$

The expected sign of each coefficient is in parentheses.

3. Results

This section shows the results of Logit analyses for the model in Section 2 and relates differences in companies' characteristics to their adoption of DC plans during each stage in the evolution of DC plans in Japan. We also analyze differences in adoption of DC plans between companies listed on the first section and those that are not.

3.1 Characteristics of data

Table 3-1 shows the descriptive statistics of the explanatory variables used in the Logit analyses. We present the original data for number of employees. We examine by independent t-test differences between companies with and without DC plans, differences in stage of adoption, and differences between companies listed on the first section and those that are not.

Differences in pension deficit ratio and company scale (number of employees) are statistically significant between companies with and without DC plans. The pension deficit ratio is smaller for companies without DC plans. Companies with DC plans have more employees.

There is a statistically significant difference in pension deficit ratios between companies that adopted DC plans during the introductory stage and those that adopted during the growth stage. There also is a statistically significant difference in company scale between companies that adopted DC plans during the growth stage and the review stage. Further, differences in corporate performance ratios and company scale are statistically significant between companies listed on the first section and those that are not.

As Table 3-2 shows, we found no explanatory variables with strong correlations. Therefore, we used the four explanatory variables in the Logit model in Section 2.3.

3.2 Results of Logit analysis

Table 3-3 shows the results of Logit regression for all companies. (A) displays the analytical detail of factors that we relate to adoption of DC plans. During the sampled period, companies adopted DC plans as their company scale expanded and as their pension deficit ratios declined. Coefficients for cash flow volatility and corporate performance ratio are not significant. These results accord with Yoshida (2009).

Table 3-1 Descriptive Statistics

	companies with DC plans			companies without DC plans			total			t-value		
	n	mean	standard deviation	n	mean	standard deviation	n	mean	standard deviation	t-statistics	p-value	standard deviation
Pension deficit ratio	614	49.376	21.948	1270	56.384	26.663	1884	54.100	25.431	6.045	0.000 **	25.488
Cash flow volatility		2.218	5.925		2.488	14.235		2.400	12.166	0.580	0.562	5.512
Corporate performance ratio		5.006	4.545		4.611	5.046		4.740	4.890	1.703	0.089	5.008
Company scale		6115.252	19917.182		3556.595	15251.944		4390.468	16951.404	2.810	0.005 **	19067.112

	DC introduction stage			DC growth stage			DC review stage			total		
	n	mean	standard deviation	n	mean	standard deviation	n	mean	standard deviation	n	mean	standard deviation
Pension deficit ratio	122	46.224	16.761	242	51.854	21.315	354	47.984	30.062	718	48.989	25.488
Cash flow volatility		1.693	2.661		2.053	5.857		2.144	5.983		2.037	5.512
Corporate performance ratio		4.464	4.277		4.769	4.742		4.121	5.399		4.398	5.008
Company scale		11488.959	36559.841		6059.326	16230.221		3774.960	9224.783		5855.635	19067.112

	The difference between the mean					
	DC introduction and DC growth		DC introduction and DC review		DC growth and DC review	
	t-statistics	p-value	t-statistics	p-value	t-statistics	p-value
Pension deficit ratio	2.754	0.006 **	0.799	0.424	1.839	0.066
Cash flow volatility	0.804	0.421	1.129	0.259	0.184	0.854
Corporate performance ratio	0.619	0.536	0.713	0.476	1.550	0.121
Company scale	1.565	0.118	2.305	0.021 *	1.982	0.048 *

	Listed companies on the first section			Others		
	n	mean	standard deviation	n	mean	standard deviation
Pension deficit ratio	469	47.921	23.812	249	51.002	28.318
Cash flow volatility		1.681	3.414		2.707	8.071
Corporate performance ratio		4.832	4.989		3.579	4.952
Company scale		8569.380	23137.648		744.205	816.072

Notes: The t-value represents the calculated t-statistics on the difference between the mean for companies with DC plans and the mean for those without DC plans. ** and * indicate the 1% and 5% levels of significance, respectively.

Table 3-2 Correlation Coefficient among Explanatory Variables

	Pension deficit ratio	Cash flow volatility	Corporate performance ratio	Company scale
Pension deficit ratio	1.0000	0.0005	-0.1607	-0.0809
Cash flow volatility		1.0000	0.0053	-0.0170
Corporate performance ratio			1.0000	-0.0225
Company scale				1.0000

n=1884

(B) displays results of the Logit regression for the three stages during the evolution of DC plans in Japan. We confirm statistically significant differences among stages and DC plan adoptions. Companies with expanding company scale adopted DC plans during the DC introduction stage, but coefficients of other company characteristics are not significant. Companies with rising pension deficit ratios tend to adopt DC plans during the DC growth stage. In addition, companies with decreasing company scale tend to adopt DC plans during the DC review stage.

Tables 3-4 and 3-5 distinguish between companies listed on the first section and those that are not. The tables relate company characteristics to the adoption of DC plans and to the stages during which companies adopted plans. Results for companies listed on the first section parallel tendencies among all companies. However, no coefficient for explanatory variables is statistically significant among companies not listed on the first section.

These results indicate that factors underlying adoption of DC plans by listed companies exhibit differing degrees of influence during progressive stages in the evolution of DC plans. In addition, adoption factors differ between companies listed on the first section and those that are not.

4. Conclusion

This study has investigated characteristics of 1,884 Japanese firms listed on the first section in order to determine how they might be associated with adoption of DC plans during the period 2001–2011. The study also identified three stages during the development of DC plans in Japan at which companies adopted DC plans.

We find that company characteristics associated with adoption of DC plans vary during the three stages. For example, a small-scale company may find it hard to adopt a DC pension plan when the system is newly introduced. And many shifted to DB plans even when Japan

Table 3-3 The Results of Logit Analysis (All Companies)

(A) Analysis about the factors on DC adoption				(B) Differences among DC adoption stage②DC growth stage			
explanatory variables	coefficient estimates	t-value	p-value	coefficient estimates	t-value	p-value	marginal effects
constant	-2.3599	-7.731	0.000 **	-1.5005	-3.152	0.002 **	-0.334
Pension deficit ratio	-0.0078	-3.695	0.000 **	0.0077	2.387	0.017 *	0.002
Cash flow volatility	-0.0010	-0.233	0.816	0.0057	0.392	0.695	0.001
Corporate performance ratio	0.0140	1.315	0.188	0.0274	1.707	0.088	0.006
Company scale	0.2808	8.009	0.000 **	0.0416	0.754	0.451	0.009
Log-likelihood	-1139.615						
R ²	0.04174						
AIC	1.21509						
SBIC	1.22980						
Number of Samples	1884						
Conformity rate of LOGIT	1884						
	predicted Y=0	predicted Y=1	total	predicted Y=0	predicted Y=1	total	
observed Y=0	1201	69	1270	476	0	476	
observed Y=1	543	71	614	241	1	242	
total	1744	140	1884	717	1	718	
Overall conformity rate	67.516%						
(B) Differences among DC adoption stage①DC introduction stage				(B) Differences among DC adoption stage③DC review stage			
explanatory variables	coefficient estimates	t-value	p-value	coefficient estimates	t-value	p-value	marginal effects
constant	-3.6765	-6.198	0.000 **	1.9831	4.320	0.000 **	0.496
Pension deficit ratio	-0.0041	-0.996	0.319	-0.0048	-1.591	0.112	-0.001
Cash flow volatility	-0.0160	-0.617	0.537	0.0009	0.065	0.948	0.000
Corporate performance ratio	0.0009	0.045	0.964	-0.0258	-1.676	0.094	-0.006
Company scale	0.3059	4.596	0.000 **	-0.2266	-4.177	0.000 **	-0.057
Log-likelihood	-315.3778						
R ²	0.03622						
AIC	0.89242						
SBIC	0.92429						
Number of Samples	718						
Conformity rate of LOGIT	718						
	predicted Y=0	predicted Y=1	total	predicted Y=0	predicted Y=1	total	
observed Y=0	596	0	596	205	159	364	
observed Y=1	121	1	122	151	203	354	
total	717	1	718	356	362	718	
Overall conformity rate	83.148%						

Notes: The table shows the parameter estimates, t-value, p-value and the marginal effects from the logit regression. ** and * indicate parameter significance at the 1% and 5% levels of significance, respectively. It is similar in Table 3-4 and 3-5.

Table 3-4 The Results of Logit Analysis (Listed Companies on the First Section)

①DC introduction stage					
explanatory variables	coefficient estimates	t-value	p-value	marginal effects	
constant	-3.1898	-4.147	0.000 **	-0.510	
Pension deficit ratio	-0.0052	-1.019	0.308	-0.001	
Cash flow volatility	0.0102	0.319	0.750	0.002	
Corporate performance ratio	-0.0040	-0.168	0.867	-0.001	
Company scale	0.2587	3.151	0.002 *	0.041	
Log-likelihood	-233.0691				
R ²	0.02505				
AIC	1.01522				
SBIC	1.05947				
Number of Samples	469				
Conformity rate of LOGIT					
	predicted Y=0	predicted Y=1	total		
observed Y=0	372	0	372		
observed Y=1	97	0	97		
total	469	0	469		
Overall conformity rate	79.318%				

③DC review stage					
explanatory variables	coefficient estimates	t-value	p-value	marginal effects	
constant	1.8321	2.839	0.005 **	0.452	
Pension deficit ratio	-0.0053	-1.328	0.184	-0.001	
Cash flow volatility	-0.0060	-0.215	0.830	-0.001	
Corporate performance ratio	-0.0243	-1.256	0.209	-0.006	
Company scale	-0.2122	-3.012	0.003 **	-0.052	
Log-likelihood	-316.6425				
R ²	0.01690				
AIC	1.37161				
SBIC	1.41586				
Number of Samples	469				
Conformity rate of LOGIT					
	predicted Y=0	predicted Y=1	total		
observed Y=0	209	52	261		
observed Y=1	147	61	208		
total	356	113	469		
Overall conformity rate	57.569%				

②DC growth stage					
explanatory variables	coefficient estimates	t-value	p-value	marginal effects	
constant	1.4873	-2.237	0.025 *	-0.337	
Pension deficit ratio	0.0092	2.160	0.031 *	0.002	
Cash flow volatility	-0.0022	-0.072	0.942	-0.001	
Corporate performance ratio	0.0280	1.403	0.161	0.006	
Company scale	0.0357	0.504	0.614	0.008	
Log-likelihood	-300.4796				
R ²	0.01015				
AIC	1.30268				
SBIC	1.34693				
Number of Samples	469				
Conformity rate of LOGIT					
	predicted Y=0	predicted Y=1	total		
observed Y=0	302	3	305		
observed Y=1	163	1	164		
total	465	4	469		
Overall conformity rate	64.606%				

Table 3-5 The Results of Logit Analysis (Listed Companies on Other Section)

①DC introduction stage					③DC review stage				
explanatory variables	coefficient estimates	t-value	p-value	marginal effects	explanatory variables	coefficient estimates	t-value	p-value	marginal effects
constant	-2.5064	-1.399	0.162	-0.208	constant	0.4888	0.448	0.654	0.119
Pension deficit ratio	-0.0025	-0.326	0.745	0.000	Pension deficit ratio	-0.0046	-0.996	0.319	-0.001
Cash flow volatility	-0.1043	-0.934	0.350	-0.009	Cash flow volatility	0.0006	0.035	0.972	0.000
Corporate performance ratio	0.0038	0.089	0.929	0.000	Corporate performance ratio	-0.0216	-0.816	0.415	-0.005
Company scale	0.0963	0.357	0.721	0.008	Company scale	0.0277	0.166	0.868	0.007
Log-likelihood	-80.14383				Log-likelihood	-168.058			
R ²	0.01258				R ²	0.00476			
AIC	0.68389				AIC	1.39002			
SBIC	0.75452				SBIC	1.46066			
Number of Samples	249				Number of Samples	249			
Conformity rate of LOGIT	89.960%				Conformity rate of LOGIT	57.831%			
observed Y=0	224	predicted Y=0	0	total	224	predicted Y=0	2	101	103
observed Y=1	25	predicted Y=1	0	25	observed Y=1	4	142	146	146
total	249	total	0	249	total	6	243	249	249
Overall conformity rate	89.960%				Overall conformity rate	57.831%			
②DC growth stage					④DC final stage				
explanatory variables	coefficient estimates	t-value	p-value	marginal effects	explanatory variables	coefficient estimates	t-value	p-value	marginal effects
constant	-0.7023	-0.605	0.545	-0.151	constant	0.0058	1.165	0.244	0.001
Pension deficit ratio	0.0058	1.165	0.244	0.001	Pension deficit ratio	0.0090	0.553	0.580	0.002
Cash flow volatility	0.0090	0.553	0.580	0.002	Cash flow volatility	0.0227	0.808	0.419	0.005
Corporate performance ratio	0.0227	0.808	0.419	0.005	Corporate performance ratio	-0.0782	-0.438	0.661	-0.017
Company scale	-0.0782	-0.438	0.661	-0.017	Company scale	-0.0782	-0.438	0.661	-0.017
Log-likelihood	-153.6849				Log-likelihood	-153.6849			
R ²	0.00719				R ²	0.00719			
AIC	1.27458				AIC	1.27458			
SBIC	1.34521				SBIC	1.34521			
Number of Samples	249				Number of Samples	249			
Conformity rate of LOGIT	69.076%				Conformity rate of LOGIT	69.076%			
observed Y=0	171	predicted Y=0	0	total	171	predicted Y=0	0	171	171
observed Y=1	77	predicted Y=1	0	77	observed Y=1	77	0	77	77
total	248	total	0	248	total	248	0	248	248
Overall conformity rate	69.076%				Overall conformity rate	69.076%			

abolished tax-qualified pensions. DC plans offer several advantages, including portability, flattening of the pension benefit, and improvement of financial literacy. For the further spread of DC, more detailed analysis of the DC system adoption by companies is necessary.

Several issues remain for future scholarship. This study considered only company scale, corporate performance, underfunded pension liabilities, and cash flow volatility as characteristics related to adoptions of DC plans. We should enlarge the number of factors considered and extend the sampled period into the present. We also need to analyze the adoption of DC plans by non-public companies.

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Note

- 1) Financial institutions were excluded because their financial statements differ greatly from those of other companies.

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