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Article

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Company stock in defined contribution plans and stock market returns

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ABSTRACT

Purpose: We examine whether employee ownership in DC plans are explained by either shared capitalism or managerial entrenchment motives.

Design/methodology/approach: We calculate the average monthly risk-adjusted return (alpha) of each portfolio by sorting firms into six portfolio groups based on the percentage of employer stock in market value of equity.

Findings: We find that the zero-investment strategy of buying a portfolio without employee ownership and selling a portfolio with the largest employee ownership earns 1.32% of alpha per month. Further, we provide evidence that portfolios with higher employee ownership experience greater distress risk.

Research limitations/implications: These findings suggest that the capital market significantly overvalues firms with employee ownership in DC plans, supporting managerial entrenchment motives.

Originality/value: To the extent that there has been no research to provide time series evidence on the relation between employee ownership and stock returns, this study's novelty is that it could explain the mixed results presented by previous literature.

Keywords: Defined contribution plan, Employee ownership, Shared capitalism, Managerial entrenchment, Alpha

I. Introduction

From the 1990s, firms have offered employee ownership through defined contribution (DC) plans such as 401(k)s, rather than employee stock ownership plans (ESOP).¹⁾ As such, the effects of employee ownership have drawn considerable attention and are of interest to governments, academics, and practitioners. However, empirical evidence remains conflicted. On

the one hand, evidence from shared capitalism²⁾ suggests that managers offer employee ownership to increase employee-manager goal alignments, ultimately leading to productivity gain and improved firm performance (Jones & Kato, 1995; Wagner et al., 2003; Kruse, 2002; Robinson & Wilson, 2006; Kruse et al., 2009; Blasi et al., 2016).

On the other hand, contrasting empirical evidence suggests that managers adopt employee ownership to support management in key corporate decisions, such as director elections and takeover issues, possibly assisting top management entrenchment (Park and Song, 1995; Rauh, 2006; Faleye et al., 2006; Park,

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2017). Due to an employee's fixed claims on a firm's cash flow, such as wages and compensation, employers may curb shareholder value maximization according to support management (Jensen and Meckling, 1976). Rauh (2006) finds that the changes in Delaware's case law from the late 1980s to the 1990s led to subsequent decreases in employee ownership through DC plans. He presents evidence that managers offer employees company stock in DC plans as an anti-takeover measure, with employee ownership and anti-takeover laws as substitutes. Using a large sample of proxy voting outcomes, Park (2017) documents that employee ownership through DC plans has a significantly positive relation with the level of voting support for management-sponsored proposals.

Given that conflicting evidence of previous empirical studies are typically based on cross-sectional analysis, we conduct a time series analysis on the relation between employee ownership and stock returns. If employee ownership is mainly driven by shared capitalism, employees are motivated to work hard and improve productivity, resulting in higher shareholder value. However, if the capital market fails to recognize the positive effects of employee ownership, we would observe positive stock returns in the future. Conversely, if managers are insulated from takeover threats or shareholder pressures using employee ownership, they tend to overinvest for empire-building (Jensen, 1986) or increase workers' wages without revising capital expenditure to enjoy the quiet life (Bertrand and Mullainathan, 2003).³⁾ Accordingly, weakened corporate governance would negatively affect the

stock returns of firms with high employee ownership if capital markets fail to recognize the adverse effects of employee ownership.

By sorting firms into six portfolios based on employee ownership, we find that a zero-investment strategy that buys a portfolio without employee ownership and sells a portfolio with the highest employee ownership earns 1.32% of alpha per month. These findings suggest that capital markets significantly overvalue firms with employee ownership in DC plans and support entrenchment. Further, we find that portfolios of firms with higher employee ownership experience greater distress risk despite improved operating performance, which could be one reason for the lower returns of portfolios with higher employee ownership. Since there has been no research to reveal time series evidence on the relation between employee ownership and stock returns, this study's novelty is that it could explain the mixed results presented by previous literature. Furthermore, by focusing on the relationship between employee ownership in DC plans and stock returns, rather than previous research which centered on firm performance, we can determine whether portfolios with higher employee ownership experience greater distress risk.

II. Literature review and hypothesis

According to agency theory, the misalignment of goals between principals and agents has an impact on firm performance because agents' decisions or actions may be in conflict with principals' best interests. In this regard, organizational behavior theory has suggested that employee ownership plays a role in resolving such agency problems by aligning the interests of both parties (Duncan 2001; Wagner et al.; 2003). A considerable number of empirical studies documents that shared capitalism through employee ownership contributes to enhancing corporate productivity and maximizing firm value by motivating employees to work hard and improve collaboration (Jones & Kato,

1) Many 401(k) plan holding company stocks are not DC plans entirely; they are combined with other types of DC plan features such as stock bonus, profit sharing, and ESOP.

2) Shared capitalism refers to a diverse set of arrangements made by firms to share profits with numerous employees through companions and stock ownership or incentives.

3) "Enjoying a quiet life" describes a situation in which managers avoid making difficult decisions when they are insulated from the disciplinary effects of the capital markets, such as takeovers, and then exert less effort to maximize firm value. Bertrand and Mullainathan (2003) document that wages of manufacturing workers rise by 1% and wages of white-collar workers rise by 4% in protected plants in the post-antitakeover period compared with the pre-antitakeover period. The authors further find that both the rates of plant destruction and plant creation fall.

1995; Robinson & Wilson, 2006; Kruse, 2002; Kruse et al., 2009; Blasi et al., 2016; Kim & Patel, 2020). This may be because the value of stock ownership held by employees is closely associated with the performance of the firm in which they work. Consistent with this argument, Kruse (2002) conducted a meta-analysis of a number of empirical studies on employee stock ownership and reported that the statistical significance of employee stock ownership on corporate productivity is overall significant. Kruse, Blasi, and Park (2010) document that increased productivity is one of the major reasons why substantial firms have adopted employee ownership despite concerns about the free-rider problem and employee risk aversion. Blasi, Freeman, and Kruse (2016) show that shared capitalism from employee ownership contributes to both increased firm performance and improved employee well-being. Finally, Kim and Patel (2017) argue that it is important to use employee stock ownership effectively in terms of organizational culture and human capital management.

On the other hand, employees bear potential costs from weak corporate governance by holding company stock in their DC plan assets. This is because employee ownership through DC plans tends to support management in key corporate decisions such as director elections and takeover issues, possibly helping the top management stay entrenched. As much as employees are interested in job security, they would support incumbent managers in hostile takeover bids. Consistent with this argument, a large number of previous studies providing supporting evidence that managers use ESOP as a takeover defense (Scholes & Wolfson, 1989; Pegano & Volpin, 2005; Chang & Mayers, 1992; Chaplinsky & Niehaus, 1990; Gordon & Pound, 1990). Empirical studies also support the use of company stock in DC plans for corporate control motives. Brown et al. (2006) document that firms having dual classes of stock are less likely to provide matching contributions with company stocks. Rauh (2006) also find that the changes in Delaware case law from the late 1980s to the 1990s lead to subsequent decreases in employee ownership through DC plans. The author presents evidence that managers offer employees

company stock in DC plans as an anti-takeover measure, while employee ownership and anti-takeover laws are a substitute for it. In addition, Park (2017) documents that by using a large sample of proxy voting outcomes, firms with employee ownership are more likely to receive higher voting support for management-sponsored proposals. Due to employees' fixed claims on a firm's cash flow, such as salary (Jensen and Mackling, 1979), employee owners may curb shareholder value maximizing by voting with management. If managers are insulated from takeover threats or shareholder pressures, they tend to overinvest for empire-building (Jensen, 1986) or increase workers' wages and make no changes in capital expenditures to enjoy the quiet life (Bertrand and Mullainathan, 2003).

Based on the previous studies mentioned above, we investigate the effect of employee ownership on the stock value of the firm by testing the following null hypothesis. If employee ownership is mainly driven by shared capitalism, employees are motivated to work hard and improve productivity, resulting in higher shareholder value. Accordingly, increased productivity would positively affect the stock returns of firms with greater employee ownership. However, if the capital market fails to recognize the positive effects of employee ownership right away, we would observe positive stock returns in the future. Conversely, if managers are insulated from takeover threats or shareholder pressures using employee ownership, they tend to overinvest or enjoy the quiet life. Accordingly, this weakened corporate governance would negatively affect the stock returns of firms with high employee ownership if capital markets fail to recognize the adverse effects of employee ownership. The mechanisms discussed above suggest that firms with higher employee ownership would have higher stock returns when employee ownership is motivated by shared capitalism. In contrast, firms with higher employee ownership would generate lower return when employee ownership is motivated by managerial entrenchment. Thus we state our null hypothesis as follows:

Null hypothesis: There is no relationship between employee ownership and stock returns.

III. Method

A. Sample

The initial data include firms with at least one DC plan. We obtain the pension data from the Form 5500 filed with the Department of Labor and the Internal Revenue Service (IRS) and use the Compustat Database to map GVKEY identifiers into the IRS Employer Identification Number of Form 5500. For firms with more than one DC plan, we use only the largest plan.⁴⁾ Then, we select NYSE, Amex, and NASDAQ firms from the Center for Research in Security Prices' monthly/daily return data. Moreover, we only include companies with at least three years of accounting or return data to prevent survival bias (Banz and Breen, 1986). We exclude observations for each year in which the employee ownership variable has greater than five standard deviations from the annual average of employee ownership to eliminate the effects of outliers. By doing so, we finally end up with 24,259 firm-year observations across 2,200 unique firms over fiscal year periods from 1999-2014.

B. Variable definition

As we are interested in the relation between company stock in DC plans and stock return, the main variable of this study is company stock in DC plans. Form 5500 includes the variable showing the number of plan assets invested in company stock at the end of a plan year, and we divide this by a firm's equity market value. This refers to the proportion of a firm's equity market value that employees hold through DC plans. We use this variable because the same dollar amount of company stock in pension plans would have a different impact on firms depending on their market value. Furthermore, the percentage of ownership in a firm's market value is a traditional measure of the impact of institutional, blockholder,

and managerial ownership on firm value.⁵⁾

Table 1 presents the summary statistics of employee ownership for the final sample by year. As evident from Table 1, the number of firms with nonzero DC employee ownership and both measures of employee ownership show a steady decline over time, with a steady deviation from company stock as an investment option from the menu of DC plans.

C. Portfolio formation procedure

To estimate the effect of company stock in DC plans on stock market return, we sort firms into six portfolio groups based on the percentage of employer stock in the market value of equity. The first portfolio contains firms without company stock in DC plans, and the five subsequent portfolios are formed using the quantile of the distribution of employer stock in DC plans. We select July for the portfolio formation date to ensure that the accounting information for the fiscal year ending in year $t-1$ is considered by the market (Fama and French, 1993). Hence, in July of year t , the selected companies are allocated to a portfolio according to the percentage of employee ownership in December of year $t-1$. Portfolios are reformed annually, and we create the monthly portfolio return series by value weighting or equally weighting firms from July of year t to June of year $t+1$. The available monthly portfolio returns range from July 2001 to December 2015.

Table 2 presents the descriptive statistics of the composition of the six portfolios. As shown in Panel A, the average level of employee ownership across portfolios is widely dispersed. A portfolio with no employee ownership tends to be smaller and have a lower book-to-market ratio than firms in portfolios with nonzero employee ownership. Note that the

4) The main results remain qualitatively similar if we total the plan assets of the plans.

5) In addition, we adopt the proportion of employee holdings invested in company stock in DC plan assets. This is a useful measure of employee ownership, given that plan trustees appointed by management have discretion in determining investment options of the menu in DC plans, hence, managers would adjust the level of company stock in DC plans without difficulty (Rauh, 2006). The main results are robust with this proxy.

Table 1. Employee ownership in defined contribution plans by year

Fiscal year	Number of firms in sample	Number of firms with employee ownership	Percentage of firms with employee ownership	Percentage of employee DC holdings invested in company stock (nonzero employee ownership only)	Percentage of firm's equity market value held by employees in DC plans (nonzero employee ownership only)
1999	1,000	445	44.5	28.2	2.9
2000	1,693	723	42.7	27.3	3.1
2001	1,594	693	43.5	26.5	2.9
2002	1,654	699	42.3	23.6	2.8
2003	1,630	691	42.4	23.3	2.7
2004	1,603	672	41.9	21.6	2.4
2005	1,590	689	43.3	20.7	2.2
2006	1,537	637	41.4	19.3	2.0
2007	1,467	582	39.7	17.2	1.8
2008	1,428	555	38.9	15.0	1.8
2009	1,465	569	38.8	15.1	2.0
2010	1,409	540	38.3	15.2	1.9
2011	1,350	497	36.8	13.8	1.7
2012	1,292	464	35.9	13.6	1.7
2013	1,344	497	37.0	14.1	1.6
2014	1,257	450	35.8	13.3	1.5
Total	23313	9403	40.2	19.2	2.2

This table reports summary statistics for the employee ownership variable of the final sample by fiscal year. We obtain the number of firms with employee ownership in DC plans, the value of DC employee ownership, and the total DC assets from Form 5500 filings. The first two columns report the total number of firms in the sample and the total number of firms with nonzero employee ownership in DC plan. The third column provides the percentage of firms with nonzero DC ownership in the sample. The next two columns report the percentage of employee DC holdings invested in company stock and the percentage of a firm's equity market value that employees hold through DC plans, respectively.

Table 2. Descriptive statistics

	0	1	2	3	4	5
Panel A: Portfolio Characteristics						
% Employee Ownership	0	0.144	0.542	1.188	2.427	6.914
Size	3,811.7	7,830.6	6,885.9	8,504.1	7,337.7	7,312.9
B/M	0.671	0.623	0.670	0.702	0.732	0.763
Number of Firms	1,3910	1,888	1,888	1,872	1,879	1,876
Panel B: Returns						
Value-weighted Portfolios						
Mean	1.26	1.04	1.14	1.18	1.35	1.28
SD	6.24	5.60	5.51	5.51	5.25	4.87
Equally-weighted Portfolios						
Mean	1.43	1.14	1.25	1.34	1.49	1.39
SD	6.23	5.69	5.69	5.67	5.50	5.04

This table reports descriptive statistics on the composition of the 6 portfolios and their returns. The sample in Panel A consists of 23,313 firm-year observations, covering firms filing Form 5500 from the fiscal year of 1999 to 2014. The first portfolio (zero) includes firms without company stock in DC plans, and the next five portfolios are formed using the quantile of the distribution of company stock in DC plans. Panel A reports the annual averages % of employee ownership, the market capitalization (in millions of dollars), the book-to-market ratio, the number of firms in each portfolio. Panel B compares the mean and standard deviation of returns of both value weighted and equally weighted portfolio for the 186 months from July 2000 to December 2015.

number of firms with no company stock in DC plans are seven times greater than the other portfolios. In Panel B of Table 2, Portfolio 1 has the lowest average monthly returns and Portfolio 4 has the highest average monthly returns, both in value weighted and equally weighted. However, there is no clear pattern across the portfolios.

IV. Results

A. Raw returns

As stated previously, if company stocks in DC plans are mainly driven by managers' corporate control motives (shared capitalism motives), and moreover, investors do not recognize the negative (positive) effects of employee ownership, these firms would be overvalued (undervalued) compared to firms with no or lower employee ownership. Therefore, we test whether the current market valuations support either shared capitalism or managerial entrenchment. Table 3 presents compounding returns at different horizons for both value-weighted and equally-weighted portfolios sorted by employee ownership. By examining value-weighted portfolios in Panel A, we note that in the first quarter (S1), after formation, Portfolio 5 earns

the lowest return of approximately 4.11%. In the first year after portfolio formation (Y1), Portfolio 5 still earns the lowest return, which continues to remain the lowest across the rest of the universe of stocks until three years after formation. Conversely, Portfolio 1 generates the highest return in the first year after formation, and this pattern continues until five years after formation. The situation for equally-weighted portfolios in Panel B is similar to that of value-weighted portfolios. Regardless of investment horizons, Portfolio 5 generates the lowest return across other portfolio groups while Portfolio 1 generates the highest return across the groups. Overall, our results provide evidence suggesting that the returns for the portfolio with higher employee ownership is lower than other portfolios without lower employee ownership; this pattern persists even three years after formation.

B. Risk-adjusted returns

As the results of raw returns in the previous section are affected by risk factors, it is necessary to calculate abnormal returns by controlling for risks related to size and book-to-market. Using the Fama-French three factor model, we test whether companies with higher employee ownership earn lower risk-adjusted

Table 3. Raw returns

PF	0	1	2	3	4	5
Panel A: Value-weighted						
S1	5.37	6.41	6.21	4.90	4.40	4.11
Y1	17.67	20.83	19.85	15.84	13.91	13.02
Y2	19.07	22.60	20.91	16.83	15.28	14.06
Y3	20.64	24.80	22.97	17.93	16.80	15.48
Panel B: Equally-weighted						
S1	6.17	7.22	6.55	5.39	4.72	4.37
Y1	20.53	23.89	20.91	17.32	14.87	13.78
Y2	22.30	26.32	21.97	18.44	16.30	14.84
Y3	24.34	29.28	24.15	19.78	18.00	16.32

In July of year t , stocks with company stock in DC plans in December of year $t-1$ are assigned to 6 groups. The first portfolio (zero) includes firms without company stock in DC plans, and the next five portfolios are formed using the quantile of the distribution of company stock in DC plans. Panel A reports compounded returns for value weighted portfolios while Panel B reports compounded returns for equally weighted returns. Monthly returns are compounded in the first quarter (Q1), the first semester (S1) and the year i (Yi) after portfolio formation.

Table 4. Risk-adjusted returns

Panel A: Entire sample (1999-2014)								
PF	0	1	2	3	4	5	0-5	1-5
Value-weighted								
Coefficient	0.43	0.11	0.08	0.10	0.33	-0.04	1.32	1.21
T-statistics	(11.13)	(1.28)	(0.96)	(1.23)	(1.92)	(-0.49)	(3.90)	(3.76)
Adjusted-R ²	0.14	0.11	0.11	0.11	0.11	0.10	0.03	0.03
F statistics	9472.61	1781.62	1708.51	1714.80	1651.16	1663.07	13.62	12.29
Equally-weighted								
Coefficient	0.23	0.03	-0.04	-0.04	0.19	-0.07	1.62	1.17
T-statistics	(5.80)	(0.30)	(-0.48)	(-0.49)	(1.24)	(-0.94)	(5.64)	(5.66)
Adjusted-R ²	0.14	0.11	0.11	0.11	0.11	0.10	0.03	0.03
F statistics	9668.61	1785.22	1708.99	1644.59	1645.82	1653.07	13.41	12.29
Panel B: Subsample period (1999-2006)								
PF	0	1	2	3	4	5	0-5	1-5
Value-weighted								
Coefficient	0.58	-0.06	0.07	0.21	0.32	-0.25	2.17	1.78
T-statistics	(8.29)	(-0.43)	(0.48)	(1.54)	(1.34)	(-2.01)	(3.19)	(3.03)
Adjusted-R ²	0.14	0.11	0.11	0.11	0.11	0.10	0.04	0.04
F statistics	3387.70	681.13	581.45	543.55	533.06	523.18	4.45	3.29
Equally-weighted								
Coefficient	0.23	-0.14	-0.21	-0.08	0.02	-0.49	3.57	2.65
T-statistics	(5.80)	(0.30)	(-0.48)	(-0.49)	(1.24)	(-2.94)	(6.25)	(7.05)
Adjusted-R ²	0.14	0.11	0.11	0.11	0.11	0.10	0.04	0.04
F statistics	3456.99	689.09	592.51	554.88	538.34	519.95	4.11	3.55

In July of year t , stocks with company stock in DC plans in December of year $t-1$ are assigned to 6 groups. The first portfolio (zero) includes firms without company stock in DC plans, and the next five portfolios are formed using the quantile of the distribution of company stock in DC plans. The sample period of Panel A is from 1999 to 2014 while that of Panel B is from 1999 to 2006. Tables report the constant (alpha) from a time-series regression of portfolio excess returns on the Fama-French three factors, which are the market excess return (mktex), the return on the HML portfolio, and the return on the SMB portfolio in both value weighted and equally weighted portfolios. T-statistics (in parentheses) and R^2 are reported as well.

returns. All firms in our sample are first sorted by holdings of company stock in their pension plans for each year, and then, the firms with employee ownership are sorted into five portfolios by quintiles of employee ownership. We assume that market participants obtain the information on employee ownership in the first half of each year, and accordingly rebalance each portfolio by the end of June each year.⁶⁾

6) For example, we calculate the alphas of the portfolios formed as of June 30, 2015 for the year 2014 using the monthly stock return data over the period of July 2015 to June 2016.

Panel A in Table 4 reports alphas, t-statistics, and R^2 of the time series regressions for each portfolio and hedge portfolios,

$$R_{it} = \alpha_i + b_i EXM_t + h_i HML_t + b_i SMB_t + \varepsilon_{it}, \quad (1)$$

where R_{it} represents a portfolio's excess return, EXM_t the market excess return, HML_t is the return on the HML portfolio (the equal-weight average of the returns for the two high B/M portfolios for a region minus the average of the returns for the two low B/M portfolios), and SMB_t is the return on the SMB

portfolio (the equal-weight average of the returns on the three small stock portfolios for the region minus the average of the returns on the three big stock portfolios). Starting with evidence from Panel A over the entire sample period, Portfolio 0 has significantly positive intercepts in both value-weighted and equally-weighted. For example, value weighted Portfolio 0 generates a significantly positive alpha of 0.43% per month (5.16% annually), while equally weighted Portfolio 0 generates a significantly positive alpha of 0.23% per month (2.76% annually). The statistical significance of intercepts for portfolios with nonzero employee ownership are not as strong as Portfolio 0. One possible explanation for this could be the significant difference in sample size as shown in Panel B of Table 2. Conversely, Portfolio 5 earns negative alpha in both value-weighted and equally-weighted. The last two columns of Panel A report alphas of the time series regression of hedge portfolios. The hedge (0-5) portfolio consists of a long position in Portfolio 0 and an offsetting short position in Portfolio 5, while the hedge (1-5) portfolio consists of a long position in Portfolio 1 and an offsetting short position in Portfolio 5. As evident in Panel A, all hedge portfolios generate significantly positive alphas, confirming that firms without employee ownership in DC plans have higher risk-adjusted returns than firms with higher employee ownership. For example, the value weighted hedge (0-5) portfolio earns a significantly positive alpha of 1.26% per month (15.12% annually), while the equally weighted hedge (0-5) portfolio earns a significantly positive alpha of 1.57% per month (18.84% annually). The low R-square values in Table 4 are not surprising in these types of analyses using the Fama-French three factor model. Prior literature attributes the possible reasons of low R-square to beta mismeasurement or errors in variable problem (Roll & Ross, 1994; Kothari et al., 1995; Kim, 1995).

We conduct a similar analysis for the subsample period of 1999-2006 because we believe investors would pay more attention to company stock in DC plans in which the fiduciary duty of plan trustees has been reinforced since the adoption of the

diversification rule of the Pension Protection Act (PPA) of 2006. Under the diversification provision of the PPA of 2006, participants are allowed to immediately diversify elective deferrals (employee contributions) invested in employer securities. After the adoption of the PPA 2006, DC plans have steadily decreased their holdings of company stock (Engelhardt, 2011, Park 2020), and the fiduciary duty of plan trustees have been reinforced. Therefore, we expect that any negative relations between employee ownership and the stock return has been mitigated in the period of the post-adoption of the PPA 2006. Accordingly, we expect that the negative effect of employee ownership driven by managerial control motives would be stronger in the subsample of 1999-2006. As such, we expect lower returns for portfolios with higher employee ownership in this subsample period compared to the results in all sample periods. As shown in Panel B of Table 4, portfolios with the highest employee ownership have significant negative alphas in both value weighted and equally weighted portfolios. Further, the alphas from the hedge portfolio are greater than the alphas in Panel A, supporting managerial entrenchment motives and suggesting that firms with higher employee ownership tend to be more overvalued before the adoption of the PPA 2006. In other words, the subsample results indicate that any negative relation between employee ownership and stock return has been mitigated in the period post the adoption of the PPA 2006. In summary, the evidence presented in this section suggests firms with higher employee ownership in DC plans have lower returns than firms with no employee ownership. The difference in returns is not explained by market risk, book-to-market ratio, or size. Rather, the negative relation between employee ownership in DC plans and market-adjusted returns can be explained by managerial entrenchment motives. According to Jegadeesh and Titman (1993), past winner stocks tend to outperform past loser stocks in the following year. By including a momentum factor in the time series regression, we report alphas from risk-adjusted returns by estimating the four-factor model and confirm that the results are similar (untabulated) to the results of the three-factor model.

V. Robustness analysis

In this section, we begin with conducting an analysis of portfolio characteristics according to the proportion of company stock in DC plans. By doing so, we investigate the lower returns of firms with higher employee ownership which can be explained by certain characteristics of portfolios. In addition, reviewing portfolio characteristics allows us to identify whether mispricing in this study is related to an anomaly identified in previous literature. Untabulated results show that momentum, accruals, earnings to assets, and cash flows are unlikely explain the lower returns of firms with higher employee ownership. Therefore, we show that lower returns of firms with higher employee ownership are related with two different measures of distress risk. The panel A of Table 5 reports Altman's Z-score, inversely related to distress risk. The panel B provide KZ index, positively related to distress risk. As shown in Table 5, both measures show that distress risk increases according to employee ownership, regardless of the time periods.

We further investigate the relation between distress risk and employee ownership by examining the returns on employee ownership firms according to the level of distress risk. By doing so, we can observe how employee ownership interacts with distress risk in determining returns. Firms are independently sorted by employee ownership and Altman's Z-score, and equally-weighted portfolios are formed by the intersection of these two sorts. The results of the entire sample period in Panel A in Table 6 indicate that lower returns of higher employee ownership are not limited to firms with higher distress risk. In fact, the portfolios with the highest employee ownership in all distress risk sextiles generate negative alphas. As shown in Panel B in Table 6, magnitudes of alphas become larger and statistical significance becomes stronger in the subsample period. To further solidify our results, we apply the Fama-Macbeth (1973) approach to examine whether the predictive power of employee ownership for returns in time series regressions are still valid in the cross-sectional regression at the firm level. Given the evidence that distress risk is positively associated with employee ownership, we include

Table 5. Portfolio characteristics

PF	0	1	2	3	4	5
Panel A: Altman's Z-score						
-Y3	16.748	16.996	14.103	12.170	11.074	10.410
-Y2	10.901	11.110	9.313	8.102	7.360	6.935
-Y1	5.659	5.783	4.715	4.061	3.646	3.436
Y1	5.056	5.205	4.638	4.163	3.799	3.608
Y2	10.298	10.536	9.236	8.206	7.510	7.108
Y3	15.282	15.629	13.793	12.584	11.357	10.768
Panel B: KZ index						
-Y3	1.002	0.913	0.922	1.049	1.093	1.170
-Y2	1.947	1.788	2.075	2.064	2.219	2.288
-Y1	2.988	2.750	3.021	3.116	3.299	3.466
Y1	1.019	0.883	1.056	1.156	1.068	1.110
Y2	1.067	0.970	1.141	1.246	1.159	1.200
Y3	3.005	2.647	3.337	3.225	3.206	3.326

In July of year t , stocks with company stock in DC plans in December of year $t-1$ are assigned to 6 groups. The first portfolio includes firms without company stock in DC plans, and the next five portfolios are formed using the quantile of the distribution of company stock in DC plans. Panel A and B present Altman's Z-score and KZ index. The higher the score of Altman's measure (KZ index), the lower (the higher) the distress risk. Periods of Panels present range from the third year before portfolio formation(-Y3) to the third fiscal year ending after portfolio formation(Y3).

Altman's Z-score as an explanatory variable along with employee ownership, beta, size, and B/M past six-months' returns. In untabulated results, we find a negative relation between employee ownership and returns, which is not significantly different from zero. Instead, there is a significantly negative relationship between distress risk and returns, suggesting that the

predictive power of employee ownership for returns in the time series regression could be partially related to the characteristics of firms under financial distress. Overall, this results suggest that distress risk is not a necessary condition to determine the lower returns of firms with higher employee ownership.

Table 6. Double sorting: Company stock in DC plans and distress risk

Panel A: Entire sample (1999-014)						
Employee ownership						
Altman's Z-score	0	1	2	3	4	5
0	0.72 (5.79)	0.19 (0.71)	0.28 (1.00)	0.16 (0.54)	-0.11 (-0.58)	-0.12 (-0.57)
1	0.07 (0.68)	-0.12 (-0.51)	0.17 (0.74)	-0.03 (-0.17)	0.31 (1.36)	-0.14 (-0.71)
2	0.23 (2.40)	0.09 (0.49)	0.01 (0.04)	-0.20 (-1.10)	0.27 (1.39)	-0.03 (-0.16)
3	0.19 (2.35)	0.18 (0.87)	-0.20 (-1.05)	-0.13 (-0.74)	0.23 (1.34)	-0.27 (-1.71)
4	0.08 (0.94)	-0.26 (-1.52)	-0.32 (-1.97)	-0.14 (-0.81)	0.04 (0.21)	0.03 (0.17)
5	0.01 (0.07)	0.04 (0.22)	-0.25 (-1.42)	-0.02 (-0.10)	0.28 (0.85)	-0.75 (-2.24)
Panel B: Subsample period (1999-2006)						
Employee ownership						
Altman's Z-score	0	1	2	3	4	5
0	1.34 (6.50)	1.05 (2.22)	0.55 (1.15)	-0.46 (-1.10)	-0.31 (-1.18)	-0.68 (-2.41)
1	-0.09 (-0.56)	0.01 (0.02)	0.47 (1.39)	0.15 (0.50)	0.68 (1.97)	-0.36 (-1.18)
2	0.16 (0.93)	-0.25 (-0.85)	-0.05 (-0.17)	-0.39 (-1.52)	-0.24 (-0.96)	-0.74 (-3.04)
3	0.37 (2.51)	-0.07 (-0.22)	-0.46 (-1.58)	-0.37 (-1.31)	-0.07 (-0.26)	-0.42 (-1.83)
4	0.36 (2.22)	-0.60 (-2.27)	-1.09 (-4.08)	0.08 (0.28)	-0.21 (-0.72)	-0.55 (-1.97)
5	0.51 (3.92)	0.33 (1.22)	-0.03 (-0.10)	0.21 (0.54)	0.36 (0.66)	-1.13 (-1.83)

In July of year t , stocks with company stock in DC plans in December of year $t-1$ are assigned to 6 groups. The first portfolio includes firms without company stock in DC plans, and the next five portfolios are formed using the quantile of the distribution of company stock in DC plans. These portfolios are once again formed in July of year t from the interaction of the Altman's Z-score and company stock in DC plans sort. The table reports the intercepts from time-series regression of portfolio excess returns on the Fama-French three factors, which are the market excess return (mktex), the return on the HML portfolio, and the return on the SMB portfolio in both valued weighted and equally weighted portfolios. T-statistics are provided in parentheses.

VI. Conclusion

Using company stock in DC plans, we provide the first time series evidence of the relation between employee ownership and stock returns via portfolio analysis. By sorting firms into six portfolios based on company stock in DC plans, we find that a zero-investment strategy of buying a portfolio without employee ownership and selling a portfolio with the highest employee ownership earns 1.32% of risk-adjusted alpha per month. The negative relationship between employee ownership and stock returns suggest that company stock in DC plans would be motivated by managerial entrenchment rather than shared capitalism. Accordingly, weakened corporate governance by shielding managers from market discipline would negatively impact the stock returns of firms having higher employee ownership if the capital market fails to recognize the adverse effects of employee ownership.

Amidst the rise in shared capitalism, employee ownership has been drawing great attention these days. Extensive literature emphasizes that employee ownership positively affects employee's attitudes at work, resulting in boosts in productivity and firm performance. However, as shown in our results, we need to pay attention to the possible negative aspects of employee ownership as well. In particular, offering employee stock in the form of pension plans can be seen as firms passing on the cost to workers, in that it can cause workers to lose both their jobs and their retirements during recessions.

This study is not without its limitations. One limitation of our study is that we focus on the effects of aggregate employee ownership across a large number of public firms. This results in a failure to capture micro-mechanisms of employee behavior from a small number of firms. Further, we use the proportion of company stock invested in DC plans assets a proxy for employee ownership. As a result, our study's findings may not be generalizable in that different results may be obtained if the same analysis were performed with ESOP rather than employee stock in DC plans. Given the fact that ESOP has

vesting schedules which limits their ability to be exercised, the alignment effect driven by ESOP is expected to be stronger. As such, we call on future studies to conduct similar analyses with other types of employee ownership. Because companies of different sizes or growth levels vary in their usage of employee ownership, there may be additional factors influencing stock market returns which this study was unable to capture. Additionally, due to small sizes of industry groups, it was not possible to include half of the applicable industry groups for the purposes of our research. Therefore, we encourage new studies to find ways in which to analyze any impact company size and level of growth have on employee ownership plans and incorporate the industries with currently limited data in meaningful ways to better understand this relationship.

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