

Effect of Implementing a Defined Contribution Retirement Plan on Cost for Public Employers

Charles Zhu
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Department of Statistics
University of California, Berkeley

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Abstract

This research attempts to quantify the effect of having a Defined Contribution (DC) plan on various costs for public employers in the United States, cities in particular. In order to reduce risks and overall Defined Benefit (DB) pension plan related expenses, many employers decided to take various strategies to de-risk their plans and transfer the risk to other entities. One of these strategies is by offering a DC plan in addition to a DB plan, in the hope that employees will be attracted to the ability of managing their own plans. This particular strategy transfers risk to the plan participants, but we were also able to find some increase in cost for public cities related to implementing a DC plan.

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1 Introduction

High level of unfunded pension liabilities is one of the biggest reason why many private and public employers in America went bankrupt. Years of underfunding, increase in life expectancy, high investment volatility, and low interest rate has caused financial issues for a lot of these employers. Traditional Defined Benefit (DB) pension plans were too expensive to upkeep, and that is why when the government allowed employers to use Defined Contribution (DC) plans. A lot of employers, public and private alike, froze their defined benefit plans and started to enroll their new employees into DC plans.

In recent years, especially after the big impact on DB plans in 2008, there was an increased trend for employers to move from DB pension plans to DC plans. Employers believe they are able to save cost by switching to DC plans and transfer the risks to employees. As a summer actuarial intern at a retirement consulting firm, I was told by my superiors that DC plans are actually less effective and efficient for both the employers and the employees. Currently, there are multiple studies done by different firms and public entities, but none of them are able to provide conclusive evidence about which plan is better for the employer. In addition, these studies are showing opposite effects. Some claim that implementing a new plan will save money, while other state that implementing a new plan will only add risk. The goal of this paper is to examine the effects of implementing a DC plan on salary and administration expenses of employees.

Most of the studies on this subject have been case studies done at the local level or on private companies. This paper aims to test the hypothesis at a national level by selection different cities from all over America. The hypothesis of this paper is that the combined amount of salary and administration will be higher with the implementation of a DC plan, and implementing will not actually help employers save money but will actually make it costlier for these public employers in the long term.

In order to implement this study, this paper will be separated into three main sections. Firstly, some of the previous literature and their findings will be discussed to show the relevance of the study. These empirical studies will be used to show the difficulty of this study, and how this study will contribute to the current literature. Next, the data and methodology used in this paper will be discussed. Financial data of different cities of different sizes will be gathered. Each year, public entities are required to disclose their financial positions through an annual report called the Comprehensive Annual Financial Report (CAFR). This report includes a lot of information about each public entity, including their covered salary expense, whether the entity uses a DC plan or a DB plan, and number of covered employees and retirees. The panel data will include information from 2005 to 2014 for 20 cities of different sizes in America. Using these data, a panel data regression will be performed. In the last part of this paper, the result of the regression will be discussed. The regression shows a statistically significant positive correlation between the DC plan indicator and the expenses. This paper will be very important for public employers to understand how implementing a DC plan will affect them, as they are using taxpayers money to fund these plans. Hopefully, this paper will help them make more educated decisions in terms of choosing the right plan design.

2 Literature Review

The challenge in evaluating pension plan type on evaluating employer costs is that there are a lot of factors that determine the costs to employers, such as salaries, turnover costs, and plan contribution costs. In DB plans, employers will contribute the whole amount, while in DC plans, employers will only contribute as much as employees. One of the main area of exploration in this paper is the cost saving mechanisms of implementing DC plans for public employers all across the nation, and previous research has shown opposite and contradicting results. One way to prove the hypothesis is through a panel regression that take into account of an indicator for whether a DC plan is implemented in a city. In the study, employers who only offer a traditional DB plan will be the control group, and those who either only offer a DC plan or those that offer a DC plan on top of a DB plan will be the treatment group. The goal is to analyze and compare the differences in employer cost structures between the two groups to see whether implementing a DC plan does have a effect on public employers.

The general perception of employers is that implementing a DC plan would help them reduce cost and unfunded pension liabilities, and this theory makes intuitive sense since employers are able to predict how much they need to contribute and are able to shift some of the risk of investment volatility to employees. Thom (2013) showed that DB plans are unfavorable due to the fact that it increases indebtedness for employers in the form of unfunded pension liabilities, and DC plan could be a remedy. In addition, Most and Wadia (2015) argued that people living longer are increasing cost for employers, as they need to provide retirement benefits for longer periods of time under a DB plan with a life annuity. These extra costs would be added to employers balance sheets as unfunded liabilities, which, shown in a study done by Chen (2015), would have a significant positive effect on firm idiosyncratic volatility.

However, multiple studies have shown that, although the risk was shifted to the employees, extra administrative costs associated with lower job tenure and financial education programs were incurred on the employer side. Calmers, Johnson, and Reuter (2014) explored this topic by doing a case study in Oregon, and using methods including Monte Carlo simulation and counter-factual analysis, they were able to conclude that by offering a choice between DB and DC plan, employees will terminate and retire at the time where they would receive the most retirement benefit, which would directly add cost to employers not only by increasing their benefit liability but also by incurring high administrative cost by shortening careers. Matson and Dobel (2006) claimed that because employees are often the ones making investment decisions, employers need to provide financial education to employees to better plan for retirement, so that employees will retire on time. On this issue, Dvorak (2012) stated that return advantage of DB plan is higher than DC plan, and this is a direct result of poorly timed investment decisions made by employees. In a traditional DB plan, employees do not need to make investment decisions, and contributions are often counter-cyclical, but the investment decision of a DC plan falls into the hands of the employees, and contributions are often pro-cyclical. This study shows that employees will not be ready to retire by the normal retirement age if they invest on their own and proves Matsons and Dobels (2006) point regarding the important of financial education under a DC plan, and will incur extra expenses for employ-

ers. Another way for DC plan to increase employer cost is by reducing job tenure and changing the retirement landscape. Schragger (2008) concluded that employees working in sectors with higher turnover rate would prefer a DC plan, suggesting that DC plans are better for employees who often switch jobs. When viewed from the employers side, this study suggests that employers will have to pay less in terms of retirement benefits under a DB plan, since a DB plan is better suited to retain workers from leaving the workforce and switching to another company.

These studies led to the hypothesis that cities which offer DC plans will have more cost than those that just offer a DB plan. As concluded by Ezra (2015), adopting a DC plan as a cost-saving mechanism is a self-deception, and employers, especially public ones, are better off with a traditional DB plan.

3 Description of Model and Data

The data came from different CAFRs from different public cities in the United States. It is a panel data with 20 entities and ten time periods, 2005 to 2014. There is a total of 200 observations, and 10 entities will be in the control group and 10 entities in the treatment group. Entities are randomly selected from a list of major cities in the United States to remove selection bias and to ensure the comparability of the entities. The Those that implemented a DC plan are in the treatment group, and those that did not are in the control group. This way, it is possible to analyze the before and after effects of implementing a DC plan. The main variable of interest is an indicator for whether a defined contribution plan is implemented, and the objective of this paper is to see whether the indicator is statistically significant and whether it is positively correlated to employers' costs.

For the analysis, the dependent variable will be the log of the sum of salaries expense and administrative expense. If a DC plan is implemented, the two items on the financial statement that will be mainly affected are the salaries expense and the administrative expense. This is why the log of the sum of the two variables is chosen as the dependent variable. The independent variables will be the number of employees, number of retirees, log of the amount invested in the DB plan, and an indicator for if a DC plan is implemented. In addition, the regression will also include a time fixed effect as well as an entity fixed effect. Below is the equation:

$$\log.Sal.Admin_{it} = \beta_0 + \beta_1 Emp_{it} + \beta_2 Term_{it} + \beta_3 \log.DB.Amount_{it} + \beta_4 DC.ind_{it} + \alpha_i + \delta_t + \epsilon_{it}$$

Multiple methods of analysis will be used to analyze the data. The first method of analysis is the panel regression with fixed effect, and this method will be used to see having a DC will affect the cost for public employers. Another method will be the falsification test. Some of the entities in the Treatment group implemented a DC plan between 2005 and 2014, and this will allow us to see how the cost structure changed before and after the implementation. By doing a falsification test, we will be able to eliminate some confounding factors. This way, it is possible to see whether there is a placebo effect in the data. The pros of using the above-mentioned methods are that they are very convincing and is useful in showing parallel trends. But they also have shortfalls,

and these are the fact that they need a long period of time, and 10 years might not be accurate enough for the purposes of using these methods. In addition, the control and treatment groups might be too small for an accurate analysis. In addition to these analyses, the model will be cross-validated, using model selection criteria such as the AIC and Mellows Cp score, to check for robustness. Other tests will also be performed to test for auto-correlation or heteroscedasticity present in the data.

	Employee	Retiree	DB_Amount	Salary_Expense	Admin_Expense	Year	City
Min.	1298	793	8028	29920	8914	2005	Austin : 10
1st Qu.	2483	2504	29910	186600	31560	2007	Baltimore : 10
Median	5581	4787	53900	312600	65990	2010	Chicago : 10
Mean	8811	6993	127600	512000	134200	2010	Denver : 10
3rd Qu.	10600	7688	112600	568100	154300	2012	EIPaso : 10
Max.	40760	27780	1789000	2950000	933100	2014	FortLauderdale: 10
SD	8945	6971	275289	628059	192664	NA	(Other) :140

Figure 1: *Descriptive Statistics*

Figure 1 shows the descriptive statistics for our data. For each entity, there are 10 observations, each for a year between 2005 to 2014. There is a total of 20 entities from all across the nation. This will allow the analysis to be performed in a non-localized manner so that the regression is exogenously valid. In addition, our panel is a balanced panel and will help us avoid various issues. There are many variables for our analysis. Employee is the number of active employees in a city who are enrolled in either the DC or the DB plan. Retiree is the number of terminated and retired employees in the city who are eligible to receive a benefit payment. DB_Amount is the number of thousands of dollars invested in the DB fund. DC.indicator is an indicator for whether a city had a DC plan in a particular year. Salary_Expense and Admin_Expense represent the dependent variables in the thousand-dollar unit.

4 Summary of Results

4.1 Panel Regression Result

Figure 2 shows the panel regression result for the model of interest. Model 1 includes only the indicator for DC plan, and Model 2 includes various other control variables. Both entity and time fixed effects to were added to ensure the accuracy of the regression for both models. As the result shows, all of the variables are significant at the 5% level. After taking into account of various control variables, on average, if a defined contribution plan is implemented, the combined salary and administrative expense would increase by roughly 0.1%, which translates to 650 thousand dollars for an average city. This is a lot of money that taxpayers will have to cover. Employee is positively correlated with the cost since they are currently being paid by the cities. Retiree is

<i>Dependent variable:</i>		
log.Sal.Admin		
	(1)	(2)
Emp		0.00003** (0.00001)
Term		-0.00003** (0.00001)
log.DB.Amount		0.273*** (0.060)
DC.ind	0.099*** (0.024)	0.099*** (0.023)
Observations	200	200
R ²	0.094	0.211
Adjusted R ²	0.080	0.176
F Statistic	17.680*** (df = 1; 170)	11.179*** (df = 4; 167)
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01	

Figure 2: *Summary of Panel Regression*

negatively correlated since any additional retiree will cause a decrease in the salary expense. The DB amount is also positively correlated with the expenses, meaning that for each percent increase in the DB plan contribution, the expenses will increase by 2.7%. This make sense, as the benefit received by a person is directly affected by the salary of that person. Lastly, robustness tests and model selection was used to check for better models, and this model is the one with the highest adjusted R^2 . In addition, serial correlation tests and heteroscedasticity tests were both performed as part of the analysis, and this model is the most accurate model. These results prove the hypothesis and show that when a city implement a DC plan, even if it is optional, the citys overall expenses tend to increase because of reasons such as increased salary and training expenses due to people leaving more often and increased administration expense due to the need of financial education when implementing a DC plan.

4.2 Falsification Test

Figure 3 shows the result from the falsification test. As mentioned above, some of the entities implemented a DC plan during the period between 2005 and 2014, and this allows us to see if there is a placebo effect and allows us to eliminate some confounding factors. B..1 stands for the years before the implementation, B.0 is the year of implementation, A.1 is the year after the implementation, and A.2 is two or more years after the implementation. As shown, it is expected that B..1 is not significant at all, since it would make no sense for the expenses to go up before the implementation of the DC plans. Additionally, B.0 is also not significant, since the implementation

<i>Dependent variable:</i>	
log.Sal.Admin	
B..1	0.011 (0.041)
B.0	0.024 (0.041)
A.1	0.069* (0.041)
A.2	0.138*** (0.028)
Observations	200
R ²	0.137
Adjusted R ²	0.114
F Statistic	6.603*** (df = 4; 167)
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

Figure 3: *Summary of Panel Regression*

of the plan will not affect the employer until after the year ends. For the years after the implementation, both variables are significant. The year immediately following the implementation had a much smaller increase in expense compared to two or more years after. This makes intuitive sense, as any policy change would have a lagged effect. This further shows a causal relationship between the implementation of a DC plan and increased expenses.

5 Conclusion

From this study, it is safe to conclude the effect of implementing a DC plan on public employers in America. The hypothesis was proven, and a positive correlation does exist between implementing a DC plan and the expense for a public employer. However, whether this effect is the same for private or foreign employers is something that cannot be concluded based on the result of this paper alone. In the past two years, some private companies have begun to realize the increase in expense after implementing a DC plan and are beginning to withdraw from these plans. However, public employers have yet to notice the increased expense trend, and hopefully, the result from this study will help them make more sound decisions in designing pension plans for their employees.

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