

# **Positioning Pensions for the Twenty-First Century**

Edited by Michael S. Gordon,  
Olivia S. Mitchell, and Marc M. Twinney

Published by

**The Pension Research Council**

The Wharton School of the University of Pennsylvania

and

**University of Pennsylvania Press**

Philadelphia

Copyright © 1997 The Pension Research Council of the Wharton School  
of the University of Pennsylvania

All rights reserved

Printed in the United States of America on acid-free paper

10 9 8 7 6 5 4 3 2 1

Published by

University of Pennsylvania Press

Philadelphia, Pennsylvania 19104-6097

Library of Congress Cataloging-in-Publication Data

Positioning pensions for the twenty-first century / edited by Michael S. Gordon, Olivia S.  
Mitchell and Marc M. Twinney.

p. cm.

Includes bibliographical references and index.

ISBN 0-8122-3391-3 (acid-free paper)

1. Pensions—United States. I. Gordon, Michael S. II. Mitchell, Olivia S.

III. Twinney, Marc M.

HD7125.P67 1997

331.25'2'0973—dc21

96-53837

CIP

## Chapter 10

# **Public Pension Plan Efficiency**

---

Ping-Lung Hsin and Olivia S. Mitchell

Population aging and fiscal stress are exerting pressures on public retirement systems worldwide. Finding ways to reduce the high costs of public pensions without contributing to a serious reduction in the quality of retirement services is an issue of public concern in the United States, where aging patterns combined with early retirement trends are exerting pressure on state and local government pension plans. When viewed against the backdrop of probably limited opportunities for collecting new public revenue, public sector plan managers are increasingly focusing on ways to make their pension plans function more efficiently. The topic is also one of central concern to policymakers elsewhere in the developed world and increasingly a prime target for reform in developing countries (Reid and Mitchell 1995).

This chapter investigates the determinants of pension administrative costs in state and local pension plans in the United States, seeking to draw lessons which might improve the design and governance of public pensions both in developed and in developing countries. In particular, streamlining public employee pensions without contributing to serious reductions in the quality of retirement services is a topic of great current interest. For example, some policymakers argue that governments should contract-out pension services, following the path taken by Chile in 1981 when that country turned most of its retirement system over to private (albeit heavily regulated) pension managers. While in Chile the privatization approach appeared to be quite costly initially, plan costs have declined of late (Reid and Mitchell 1995). Administrative costs may also vary depending on how the pension plan is organized and managed. For instance, in the United States there is a great deal of variation across public plans in terms of how their fiduciary boards are constituted, who authorizes their administrative cost budgets, and what kinds of participants are included in the plans. These differences in structure may influ-

ence administrative efficiency of the plans and could afford insights into how changing the way plans are structured could help save taxpayer money. Each of these possibilities is examined in the analysis below.<sup>1</sup>

### **Prior Studies of Pension System Administrative Efficiency**

Previous research on pension administration costs has been mainly limited to simple multivariate analysis of *private* pension plans. The hypothesis examined in the few available analyses is straightforward, namely, that administrative costs rise less than proportionately as the size of the pension plan grows because certain inputs such as computer, accounting, payroll, or money management systems are lumpy investments. As a result, one would expect that as a pension system expands, plan costs would rise less than proportionately. If it could be proved that there are substantial cost savings from larger pension plans, this would suggest in the public sector, at least, that efforts to merge and coalesce larger groups of participants and plan assets could save taxpayer money. Conversely, breaking up large pension pools would be likely to make retirement systems more, not less, cost effective.

The first empirical study in the US context to examine the scale economies hypothesis in pension plans was an early piece by Caswell (1976) who focused on a subset of private-sector plans in the construction industry. These were multi-employer plans, called this because they were jointly managed by employers and unions in a collectively bargained environment. That study used multivariate linear regression to relate pension administration costs to two separate outputs—the total number of pension participants, and the total value of pension assets. Only one set of results was reported, namely, with regard to costs as they changed with the number of participants; the elasticity of costs with respect to the number of participants proved to be significantly less than unity, equaling 0.80. The study also indicated that costs rose with the number of employers covered by the system, holding constant the number of pension participants. In other words, having more pension sponsors apparently complicates pension administration. A final interesting finding in Caswell's study was that the pension system's administrative expenditures were not significantly affected by using in-house administrative staff compared to externally contracted agencies.

Some years later a follow-up study on multiemployer plans was carried out by Mitchell and Andrews (1981), who drew on Form 5500 pension plan reports filed in 1975 with the Department of Labor. Those authors estimated a Cobb-Douglas cost function, and found evidence for scale

economies in that administrative expenses rose by only 0.80 if the size of the participant pool rose by 1 percent. Similar results were obtained by Cooper, Crabb, and Carlsen (1984) who also used a Cobb-Douglas cost function to estimate the determinants of pension system operating expenses. That analysis concluded that for each of three measures evaluated (participants, net pension assets, and employers' annual contributions) there appeared to be scale economies. Finally, Parsons (1992) recently reiterated the conclusion of scale economies for private pension plans, this time using aggregate rather than micro (plan-level) data.

The finding that there are substantial scale economies in *private*-sector pensions has not yet been extensively evaluated using *plan-level* information for *public* pension plans, nor has much multivariate analysis been undertaken. An *aggregate* data effort collected cross-national information on social security systems in a large number of developed and developing countries and found wide variation in administration costs across that set of nations. For example, Social Security administration costs averaged only 2 to 3 percent of benefit expenditures in the United States Social Security system and likewise across the large plans hosted by the OECD nations. In contrast, for the far smaller systems of Latin America and the Caribbean nations, social security administration costs averaged 28 percent of benefit expenditures (Mitchell et al. 1993, 1994). While little information is available with which to conduct multivariate analysis of scale economies internationally, two exploratory studies are supportive of the scale economies hypothesis (Reid and Mitchell 1995; James and Palacios 1995). Thus far, however, no careful multivariate state and local analysis has been carried out, a subject we turn to in the next section.

### **Measuring Administrative Efficiency of Public Employee Retirement Systems**

Having found that the hypothesis of scale economies is confirmed for private pension plans and national social security programs, the question we turn to next is whether the hypothesis holds for US state and local pension plans as well. A related question we ask is whether the simpler cost studies of the past may have erred in assuming that pension plans are managed as efficiently as possible. Conventional cost studies assume that an institution operates on the feasible and economically efficient frontier with minimum possible expenditures, given the size of the pension plan as well as technological and environmental factors. This assumption may not hold in the public sector, since public retirement systems are generally not subject to direct market competition. If public pension plans operate far inside the administratively efficient

frontier, we would be led to ask how substantial this inefficiency gap is and what factors might be associated with substantial inefficiencies. In the analysis below we test for this possibility directly.

The data set used for this study is known as the 1992 PENDAT data file, a cross-sectional survey of more than 300 public employee retirement systems (PERS) that together administer almost 500 state and local pension plans in the United States (Zorn 1993). Depending on the state, these plans cover public employees of all kinds, including judges and teachers, police and firefighters, among others. In 1992, these public retirement systems as a whole held assets of US \$791 billion and covered 10.6 million active members.<sup>2</sup> To assess the relative importance of administrative expenditures within these public employee pension plans, it is useful to note that such costs averaged 12 percent of public employers' annual pension contributions, or 9 percent of total pension contributions (including employees' payments) in 1992.

### The Model

In this study, public pension plan administrative efficiency is evaluated by measuring the gap between *frontier* and *actual* administrative costs. The term "frontier costs" refers to the minimum possible cost for a given amount of output and given input prices, and is denoted as  $C_0$ . If a pension plan's actual administrative costs were  $C_1$ , where  $C_1$  exceeded  $C_0$ , then that PERS would be judged not to be on the efficiency frontier. Efficiency comparisons across different PERS can be effected by comparing the ratio of their frontier to their actual costs, known as a "Farrell-type" efficiency measure,  $C_0/C_1$  (Farrell 1957). By contrast, if a public pension system's Farrell measure  $C_0/C_1$  is higher than average, this would imply that that system was administered more efficiently. A public pension system on the frontier will have  $C_0/C_1$  equal to unity.

Reported costs  $C_1$  are reported in the PENDAT file, but the frontier measure  $C_0$  is unobservable and must be estimated. This can be derived using a "stochastic frontier cost function" approach for estimation purposes, a technique which has been applied to measure the efficiency of other public services in recent years but not for public pensions.<sup>3</sup> This approach begins by specifying a general multiproduct cost function:

$$C_{1i} = f(Y, W; \alpha) + \epsilon_i,$$

where  $C_{1i}$  represents the actual administrative costs of a public retirement system  $i$ ,  $Y$  is a vector of system outputs,  $W$  is a vector of input prices faced by each system,  $\alpha$  is a vector of parameters, and  $\epsilon_i$  is the error term.

For estimation purposes the model assumes that  $\epsilon_i$  is made up of two independent components:

$$\epsilon_i = v_i + u_i, \quad \text{where } u_i \geq 0.$$

The key to this approach is contained in the specification of the composite error term  $\epsilon_i$ . The first component of the disturbance,  $v_i$ , captures random error and is posited to reflect exogenous independent changes in pension administration costs. The second error term,  $u_i$ , captures systematic technical factors that may lead to administrative costs exceeding the minimum frontier. If  $u_i = 0$ , then the retirement system  $i$  is said to be on the efficiency frontier.

To estimate the model, it is necessary to specify the exact functional form of  $f(Y, W; \alpha)$ , and the distribution of  $\epsilon_i$ . Administrative expenditures of a PERS are incurred in producing two types of services: investment management and participant services. Of course in each case, it is somewhat difficult to define the PERS ultimate output. Nevertheless, following prior analysts, we identify two intermediate measures of output that are properly related to administrative expenditures: the value of assets held by the system (ASSETS), and the number of participants (PARTI), including both currently employed and retired members (Mitchell and Andrews 1981). Expenditures for investment management increase with the value of assets, but when scale economies exist, a system with more assets will be observed to incur lower administrative expenses per dollar invested. Similarly, expenditures rise with the number of participants, but economies of scale will be said to exist if an increase in the number of participants produces less than a proportionate increase in administrative expenses.

In addition to these two variables, public pension administrative expenditures are also likely to be influenced by the composition of participants and the complexity and quality of pension services provided. Thus serving retired participants may be more expensive than serving active participants (Caswell 1976; Mitchell and Andrews 1981). Extra expenses are also incurred for serving disabled retirees because of the necessary medical examinations. We also posit that administrative expenditures increase with the complexity of pension services, represented here by the number of pension plans administered by a PERS (NUMPLAN).<sup>4</sup> Typically, different state and local pension plans administered by the same PERS are from different localities or are negotiated with different unions (Zorn 1993). Required age and service years for receiving retirement benefits are also different among these pension plans.<sup>5</sup> Therefore, the more pension plans a PERS administers, the more complicated its pen-

sion services are likely to be. Finally, we seek to measure the quality of pension services by the annualized rate of return on pension assets over the previous five years (Y5ROR).<sup>6</sup> Other things being equal, administrative expenditures may increase with pension service quality, because more and better inputs are used.

As in most cross-section cost function studies, input prices are not explicitly included in the analysis. Their omission from the PENDAT file is probably not serious because the most important wage costs for public pension systems cover the services of actuaries, lawyers, accountants, and financial advisors. Salaries for these professionals are nationally competitive and hence are not expected to vary systematically across systems (Mitchell and Andrews 1981).

To summarize, the empirical formula employed in examining public pension plans' administrative costs is expressed as a log-linear cost function:<sup>7</sup>

$$\ln(C_{1i}) = \alpha_0 + \alpha_1 \ln(\text{PARTI}_i) + \alpha_2 \ln(\text{ASSETS}_i) + \alpha_3 \text{SERRATE}_i + \alpha_4 \text{DISRATE}_i + \alpha_5 \text{NUMPLAN}_i + \alpha_3 \text{Y5ROR}_i + \epsilon_i \quad (1A)$$

where

$C_{1i}$  is the actual administrative expenditure of the retirement system  $i$ ; and SERRATE and DISRATE represent the fractions of normal retirees and disabled retirees in the total pension participant pool.

ASSETS and PARTI are highly correlated, causing problems of collinearity when both are included in the model. Hence we multiply assets per participant, ASTPER by PARTI, and rearrange equation (1A) as follows:<sup>8</sup>

$$\begin{aligned} \ln(C_{1i}) &= \alpha_0 + \alpha_1 \ln(\text{PARTI}_i) + \alpha_2 \ln(\text{PARTI}_i * \text{ASTPER}_i) + \alpha_3 \text{SERRATE}_i \\ &\quad + \alpha_4 \text{DISRATE}_i + \alpha_5 \text{NUMPLAN}_i + \alpha_3 \text{Y5ROR}_i + \epsilon_i \\ &= \alpha_0 + \alpha_1' \ln(\text{PARTI}_i) + \alpha_2 \ln(\text{ASTPER}_i) + \alpha_3 \text{SERRATE}_i \\ &\quad + \alpha_4 \text{DISRATE}_i + \alpha_5 \text{NUMPLAN}_i + \alpha_3 \text{Y5ROR}_i + \epsilon_i \end{aligned} \quad (1B)$$

where  $\alpha_1' = \alpha_1 + \alpha_2$ .

It will be readily seen that this equation is a Cobb-Douglas type cost function; thus, coefficients on output measures,  $\alpha_1$  and  $\alpha_2$ , represent output cost elasticity. The incremental proportion of administrative expenditures caused by a 1 percent increase in the number of participants is represented by  $\alpha_1'$ . These incremental expenditures include expenses for non-investment services to the added participants and the expenses of managing the assets maintained for these participants. The incremental proportion of administrative expenditures caused by a 1 percent increase in the value of assets is  $\alpha_2$ . The difference between  $\alpha_1'$  and  $\alpha_2$  is the cost elasticity with respect to non-investment services provided to

participants. Economies of scale in public pension administration would be said to exist if  $\alpha_1$  is less than one.

The administrative cost frontier of retirement system  $i$  is derived by setting the error term  $u_i$ , which is part of  $\epsilon_i$ , to zero in equation (1.B). Since the determination of the cost frontier still involves the noise error term,  $v_i$ , the cost frontier specified in this setting is called "stochastic."<sup>9</sup> Following Aigner, Lovell, and Schmidt (1977), we assume that  $u$  is drawn from a half-normal and  $v$  is from a normal distribution. In this event the model can be estimated by maximizing likelihood approach, and the Farrell-type efficiency indicator of retirement system  $i$ ,  $C_{0i}/C_{1i}$ , is equal to  $\exp(-u_i)$ . Although  $u_i$  is unobservable, the expectation of  $u_i$ , conditioned on  $\epsilon_i$ , can also be estimated.<sup>10</sup>

## Results

Table 1 reports descriptive statistics on all variables of interest for the PENDAT state and local pension plan sample. In these data, the measure

TABLE 1 Multivariate Analysis of Administrative Expenditures of Public Employee Retirement Systems

	Mean (S.D.)	Frontier Function Estimate
Dependent variable		
COST (US \$K)	6.95	
ln (administrative expenditures)	(1.88)	
Independent variables		
PARTI	8.94	0.74**
ln (N. active & ret. participants)	(2.34)	(0.03)
ASSETS (US \$M)	-2.92	0.49**
ln (mkt assets per participant)	(0.72)	(0.08)
SERRATE (%)	24.35	-0.004
Normal retirees to total participants	(11.41)	(0.006)
DISRATE (%)	2.72	0.02
Disabled retirees to total participants	(3.61)	(0.02)
NUMPLAN	1.38	0.03
N. pension plans per PERS	(1.00)	(0.10)
Y5ROR (%)	10.83	0.02
Annualized rate of return—5 year av	(1.69)	(0.03)
Constant		1.03**
		(0.63)
Log-likelihood ratio		-230.93
No. of pension systems		197

Source: 1992 PENDAT file; see text.

\*\*Indicates significance at 0.05 level.

of pension plan participants per system is computed as the sum of participants across all individual plans in each retirement system. This measure includes active and retired members, but not vested terminated members, due to the way the survey asked the question; nevertheless, since job turnover is uncommon in the public sector, excluding vested terminated members is not a matter of concern. Pension system assets are measured as the reported market value of each pension system's holdings. Administrative expenditures of public employee retirement systems are taken from annual administrative budgets reported by each pension system.

After excluding systems with missing values for these key variables, the sample for analysis consists of 197 state and local pension systems, covering a total of 272 separate retirement plans.<sup>11</sup> The first column of Table 1 presents means and standard deviations of key variables. Per-plan administrative expenditures for a state/local retirement system averaged about US \$130 per participant per year, a cost that compares favorably to median administrative expenditures per participant in large private defined benefit pension plans of about US \$110 (in 1992 dollars).<sup>12</sup>

Maximum likelihood estimates of the coefficients from the efficiency model (the  $\alpha$ 's) appear in the second column of Table 1.<sup>13</sup> Of most interest is the estimated coefficient on (the log of the number of) participants, which is about 0.74. The fact that it is substantially less than 1 implies that scale economies are powerful in the public pension arena. Specifically, a 1 percentage point increase in plan participants would be predicted to increase public plan administrative expenditures by 0.74 of a percentage point, holding assets per participant constant. This number is remarkably close to the 0.80 figure reported in the private pension arena by Caswell (1976), Mitchell and Andrews (1981), and Cooper, Crabb and Carlsen (1984).

Even greater economies are revealed in the estimated coefficient on (the log of) the market value of assets per participant. The term is equal to 0.49, suggesting that a plan with 1 percentage point additional assets would be expected to have costs rise by less than half a percent. This is not quite twice the same elasticity found for private plans (0.27; see Mitchell and Andrews 1981). Using the derivation above, we compute that administrative expenditures also rise less than one-for-one with respect to non-investment services, where the elasticity is equal to 0.25 (calculated as the difference between 0.74 and 0.49). This cost elasticity is about half that estimated for private pension plans (0.56; see Mitchell and Andrews 1981). While the overall pattern of results between the private and public plans seems similar, there is clear evidence of some differences between the way public and private pension agencies allocate money management expenditures.<sup>14</sup> In general these results confirm

that there are significant economies of scale in public pension administration for both investment and non-investment services.

Another conclusion from Table 1 is that there is evidence of substantial inefficiency in the data. Estimated  $\exp(-u)$  has an average value of 65 percent; the farther is this coefficient from 1.0, the less efficient is the pension plan. In other words, as much as one-third of pension administrative expenditures are attributable to inefficiency using this methodology. Whether this number is larger or smaller than other similar institutions is not known, but public plan efficiency in administration appears somewhat less than that of other publicly managed institutions in the United States. For example, in local police departments, about a quarter of local administrative costs have been attributed to inefficiency (Davis and Hayes 1993), and almost one-fifth in city government offices (Hayes and Chang 1990). Research on heavily regulated United States reports that inefficiency measured in the same manner seems to be roughly 15 percent of costs (Zuckerman, Hadley, and Iezzoni 1994; Newhouse 1994). The extent of inefficiency in public pension plans appears comparable to, or even a bit lower than, levels reported by researchers studying the heavily regulated property liability insurers, where up to 45 percent of costs are due to inefficiency (Berger, Cummins, and Weiss 1995).

Turning to other results in Table 1, the findings offer no support for the hypothesis that public plan administrative expenditures differ depending on the type of workers covered. This is different from results in the private sector reported by Mitchell and Andrews (1981), who found that services provided to retirees were more expensive. Table 1 also shows that administrative performance in the public pension environment is not sensitive to the number of pension plans administered, a finding which differs from Caswell's (1976) analysis of the construction industry. Finally, the investment performance of public pension assets has no statistically significant influence on administrative expenditures, although the coefficient of *Y5ROR* is positive.

### **Determinants of Pension Administrative Efficiency**

In this section we move from documenting the extent of pension administrative inefficiency to a closer examination of particular institutional features that seem to be associated with inefficient outcomes in the pension plan arena. One observation is that public retirement systems differ according to who is scheduled to pay for administrative expenditures incurred in running the plans. In nearly two-thirds of the PENDAT systems, these expenses must be paid out of plan investment earnings or from pension contributions, while in the remaining one-third of the sys-

tems such expenditures are paid out of general revenues by the sponsoring employer. We hypothesize that pension boards may spend more per unit of output if they are permitted to authorize their own budgets, an effect which could be enhanced if the board need not cover its costs out of its own budget.

A second aspect we investigate is public plan governance, namely, who is responsible for the authorization of pension benefit levels, contribution, and funding decisions in a given plan. In about half the retirement systems under study, public pension administrative budgets are authorized by the governing boards of the pension systems themselves. In the other half of the cases, regulations require the state legislature or a specific outside council to authorize administrative budgets. Whether this oversight structure has a potent effect on administrative efficiency is explored below empirically.

A different dimension along which pension board governance varies pertains to the makeup of the board itself. PERS trustees are either elected by pension participants, appointed by governor, or serve *ex officio*, and board composition varies a great deal across systems. On average, one-third of board trustees are elected by pension participants, while the other two-thirds are appointed or serve *ex officio*. In earlier analysis we found that pension funding and investment performance was somewhat lower when participants served on their pension system's board (Mitchell and Hsin 1994). It may be that having participant-elected members on pension boards also reduces measured pension administrative efficiency. On the other hand, participant-elected trustees may have fewer incentives to expand administrative budgets because they may be less concerned with their own power, prestige, or patronage and more concerned with the welfare of their constituents. Therefore, the net effect of the fraction of participant-elected trustees on pension administrative efficiency is an empirical matter.

Pension administrative efficiency may also differ between state and local governments, as argued by analysts who contend that state pension plan staffers are better trained than are staff members of local plans (Bleakney 1972). Whether this is true can be examined directly by investigating whether state pension plans prove to be administered more efficiently than local plans: in the PENDAT data file, about one-fifth of public employee retirement systems are administered by state governmental units whereas local governmental units provide day-to-day administration of the remaining systems. The type of employees may also be important along the same lines; more educated participants, such as teachers, might be in a better position to monitor plan expenses as compared to a broader mix of covered workers. Similarly, it may be that public sector unions exert a watchdog function over costs, in which case it

would be expected that plans covering unionized employees would experience measured efficiency (Mitchell and Smith 1994).

A final aspect of interest is the possible influence of contracting-out on public pension plan administrative efficiency. One form this takes among US public pension systems is that boards frequently hire professional money managers to invest fund assets. Many PERS have in-house investment staff, of course, but it is common for a public system to use at least one external private investment manager or performance measurement service (Mitchell and Hsin 1994), and, in some instances, all of the investment decisions are handled exclusively by external agents. Advocates of privatization suggest that contracting out may improve efficiency in providing public services because of different incentives driving private versus public sector managers.<sup>15</sup> Thus it is worthwhile investigating whether contracting out pension investment services to private agents improves public pension plans' administrative efficiency.

An examination of the influence of these several administrative features on pension administrative efficiency is facilitated using the following multivariate linear regression model:

$$\begin{aligned} \exp(-u_i) = & \beta_0 + \beta_1 \text{EXTPURE}_i + \beta_2 \text{BUDPAYOK}_i + \beta_3 \text{BUDOK}_i \\ & + \beta_4 \text{PAYOK}_i + \beta_5 \text{BDELMEM}_i + \beta_6 \text{STADMIN}_i \\ & + \beta_7 \text{TCHRPLAN}_i + \beta_8 \text{POFIPLAN}_i + \beta_9 \text{UNIONRT}_i + \kappa_i \end{aligned} \quad (2)$$

where  $\exp(-u_i)$  is the efficiency indicator derived in the previous section; EXTPURE is set to 1 when the public plan's investment management function is handled exclusively by external private contractors (else 0); BUDPAYOK is set to 1 if the plan's board both sets the administrative budget and must pay for it via pension investment earnings or contributions (else 0); BUDOK is equal to 1 if the plan's board authorizes administrative budgets but is not required to pay for it out of plan revenues (else 0); PAYOK is equal to 1 if the plan's board must pay for the administrative budgets but cannot authorize administrative expenses (else 0); BDELMEM is the fraction of participant-elected trustees on the pension board; STADMIN is equal to 1 if the retirement system is administered by a state governmental unit (else 0); TCHRPLAN is equal to 1 if the major participants of the system are teachers or school employees (else 0); POFIPLAN is equal to 1 if the plan covers mainly police or firefighters (else 0); UNIONRT is the fraction of active members of the system represented by unions; and  $\kappa$  is assumed to be a normally distributed error term.

This multivariate model is estimated using ordinary least squares, and descriptive statistics of all variables used are given in Table 2. Here we note that, across the systems under study, about two-thirds used external

TABLE 2 Multivariate Analysis of Administrative Efficiency of Public Employee Retirement System

	Mean (S.D.)	OLS Estimate
Dependent Variable:		
exp(-u)	65.01	
Efficiency ratio	(8.73)	
Independent Variables:		
EXTPURE	0.64	2.48*
External money managers only	(0.48)	(1.38)
BUDPAYOK	0.42	-4.01†
Admin. budget authorized & paid by pension board	(0.49)	(1.84)
BUDOK	0.18	-4.81†
Admin. budget authorized by board but paid by employer	(0.39)	(2.10)
PAYOK	0.23	0.68
Admin. budget authorized by employer but paid by pension board	(0.42)	(2.02)
BDELMEM	35.27	0.014
% of pension board elected by participants	(25.74)	(0.03)
TCHRPLAN	0.14	1.33
Teacher/school employee retirement system	(0.35)	(1.88)
POFIPLAN	0.16	-1.10
Police/fire fighter retirement system	(0.37)	(1.78)
STADMIN	0.20	-1.87
Retirement system admin. by state government	(0.40)	(1.75)
UNIONRT	73.95	0.012
% of actives rep. by union	(43.35)	(0.015)
Constant		64.82†
		(2.14)
R-squared		0.10
N. pension systems		197

Source: 1992 PENDAT file; see text.

\* t-value  $\geq 1.65$

† t-value  $\geq 1.96$

money managers to handle exclusively their investment decisions. Pension boards both authorized and paid administrative budgets through pension investment earnings or contributions in 42 percent of the retirement systems; in another 23 percent of the cases boards paid administrative expenses but did not authorize the budgets, and in 18 percent of the cases the boards only authorized expenditures. In the remaining systems, the administrative budgets were neither authorized nor paid for by pension boards. The averages also show that about one-third of public pension board trustees are elected by pension participants, with most of

the remaining trustees appointed or serving *ex officio*. Most of the retirement systems were general public employee plans, and only 14 percent were teacher-only systems, with 16 percent police- or firefighter-only systems. Most plans included some members covered by unions, averaging a 74 percent coverage rate across these PENDAT pension plans (state-only systems were one-fifth of these plans).

Estimated parameters ( $\beta$ 's) appear in the second column of Table 2.<sup>16</sup> The first estimated coefficient, which is positive and statistically significant, indicates that plans are more efficient if they contract out investment services to private money managers. This offers convincing evidence that public pension plan administrative efficiency is improved by using external investment managers, holding other factors constant. Above we hypothesized that efficiency will be lower when plan administrative cost budgets are authorized by pension boards; this hypothesis is upheld in the data as is evident from the two negative and statistically significant coefficients on these variables. Specifically, we find that granting pension boards authority over their administrative budgets decreases systems' administrative efficiency. This effect persists, and is indeed somewhat stronger, when administrative budgets can be charged to a sponsoring employer, as opposed to having the system cover its own costs directly.

Turning to other estimation results, there appears to be no systematic linkage between a public pension plan's degree of administrative efficiency and board makeup, as indicated by the coefficient on participant-elected board members. There were also no significant differences in pension administrative efficiency discerned between state versus local retirement systems, or more or less unionized plans, or between plans covering different types of employees. In general, the relatively low R-squared shows that the overall variance in plan relative efficiency is only partly associated with hypothesized explanatory variables.

### Implications

To explore further the magnitudes of these estimation results, we simulate how public pension administrative costs would be posited to change if plans could be structured more efficiently. To do this we use statistically significant coefficients in Table 2 combined with estimated inefficiency magnitudes from Table 1. The exercise to arrive at the cost savings per plan that would result from greater administrative efficiency is as follows: assume that on average 35 percent of all plans' administrative costs are inefficient based on the frontier function model; then multiply this fraction by the average dollar figure devoted to pension system administration by public plans in the PENDAT sample. As Table 3 points out, an average plan would be expected to save approximately US \$370,000 per

TABLE 3 Simulation Analysis of Public Pension Plan Administrative Expenditures

<i>Public Pension Management Technique</i>	<i>Yields Change in Annual Plan Administrative Expenditures</i>
1. If all state and local plans were administered on the efficiency frontier.	Pension administration costs would fall by US \$365 K per plan / US \$876 M PERS-wide.
2. If all state and local plans contracted out their entire investment activity to private money managers.	Pension administration costs would fall by US \$25 K per plan / US \$6 M PERS-wide.
3. If all state and local plans' administrative budgets were authorized and paid for by pension boards.	Pension administration costs would rise by US \$41 K per plan / US \$100 M PERS-wide.
4. If all state and local administrative budgets were authorized by pension boards, but paid for by the public employer.	Pension administration costs would rise by US \$50 K per plan / US \$120 M PERS-wide.

*Source:* Derived from coefficient estimates in Table 2 and median per-plan administrative expenditures of US \$1 M per plan.

year (in 1992 dollars) by operating on the efficiency frontier. This translates into estimated cost savings for the approximately 2,400 public pension plans in the country of about US \$876 million in administrative expenses.<sup>17</sup>

What if existing plans switched investment practices and utilized external money managers exclusively? Based on the figures given above, the average public pension system would save about US \$25,000 per year in administrative expenditures by contracting out all investment services to private money managers as efficient as those used by plans in the PENDAT sample. Taking this figure to the PERS universe, it is estimated that about US \$6 million per year could be saved from such a strategy.

Alternatively, what might be the result of changing pension board authority so as to permit all PERS boards to authorize, and pay for, their own administrative budgets? The results in Table 3 indicate, that for the average public plan, this move would increase administrative costs US \$41,000 per year. Averaging this figure across all PERS, administrative expenditures would be predicted to rise by about US \$100 million per year. If, instead, PERS boards' powers were restricted to authorizing administrative budgets, but administrative costs were charged to and paid for by the sponsoring employer, administrative expenditures would be predicted to rise by US \$120 million per year.

## Conclusions

Reducing the high costs of public pensions without cutting the quality of the retirement services provided by these plans is an important issue of public concern everywhere. This chapter has examined a new data set on state and local pension plans in the United States in order to investigate the determinants of pension administrative costs. Our goal has been to draw lessons which might improve the design and governance of public pensions both in developed and in developing countries.

This analysis of a large number of US state and local pension plans reveals that, on average, administrative expenditures per participant are high but not apparently higher than in private pension plans. In both cases, to take advantage of scale economies, pension plans could benefit from merging and coalescing into larger pension pools.

We have also offered evidence that pension administrative costs could be substantially reduced if the systems were operated more efficiently. A multivariate frontier function approach was used to show that, on average, the public pension systems examined here operated at about 65 percent efficiency, suggesting that substantial cost savings might be derived from better management.

In examining patterns of public pension inefficiency, we found evidence that efficiency is higher when administrative budgets are authorized by a group other than the pension board. We also find that contracting out pension investment services to private money managers improves administrative efficiency. Finally, the extent of public plan administrative efficiency varies widely among PERS. While our model revealed only some of the variation, there remain many other factors influencing public plans' administrative efficiency. To investigate these factors, more comprehensive data must be gathered, including additional information on administrative structure and control. That it is critical to do so is obvious, given the increasing authority that the federal government is devolving to states and eventually to locally run public-sector institutions.

Opinions are those of the authors and not the institutions with whom they are affiliated.

## Notes

1. We recognize that reducing administrative costs will not save insolvent and chronically underfunded pension systems; see Reid and Mitchell (1995) and Hsin and Mitchell (1994) for further discussion of this issue.

2. The public employee retirement systems included in the PENDAT data file represent the vast majority of state and local pension participants, covering 86 percent of total state and local pension plan assets and 83 percent of active pension plan members. Nevertheless the fact that the survey does not include all plans must be kept in mind when interpreting results; these plans are among the largest in the nation and perhaps are better managed than some smaller systems. Previous research on public pension funding outcomes using this data set (Hsin and Mitchell 1994) suggested no potent effect of selectivity bias, however.

3. The stochastic frontier cost approach has been applied in assessing the efficiency of several public-sector activities including municipal government (Hayes and Chang 1990; Deller and Rudnick 1992) and police departments (Davis and Hayes 1993). An early survey of the frontier function approach appears in Forsund, Lovell, and Schmidt (1980); recent developments in this approach appear in Bauer (1990).

4. This follows Caswell's specification for measuring private pension plan complexity.

5. The actuarial assumptions and the benefit accrual rates are usually the same for state and local pension plans administered by the same PERS.

6. We recognize that the service quality provided by a PERS cannot be represented solely by the rate of return on pension assets. For instance, some might argue that covered participants' satisfaction level might be a good measure of system performance. However in the PENDAT survey, the plan's rate of return is the only performance measure available in this data set.

7. We also investigated a translog cost function. However, the hypothesis that all the coefficients of the quadratic terms are equal to 0 cannot be rejected at the 1 percent significance level.

8. A different way to handle the collinearity problem is to include PARTI and ASSETS separately in two different models (e.g., Caswell 1976; Cooper et al. 1984). The cost elasticity for investment and non-investment services, however, cannot be distinguished using this approach.

9. A different type of cost frontier excludes the error term and is called "deterministic" (Greene 1980). The advantage of the stochastic specification is that estimation of the cost frontier is less likely to be influenced by data outliers. For a comparison between the two cost frontier approaches see Forsund, Lovell, and Schmidt (1980).

10. For estimation of  $E(u_i|\epsilon_i)$  see Jondrew et al. (1982).

11. The PENDAT sample is diminished by almost two-fifths due to item non-response. However, omitted plans were very small as a rule; systems analyzed still held US \$691 billion in assets, only 12 percent less than the initial group of systems surveyed. As a consequence, results reported here probably represent upper-bound estimates of public plan efficiency.

12. Expenditures per participant in private *multiemployer* pension plans averaged about US \$50/year (1992\$); see Caswell (1976), Mitchell and Andrews (1981), Turner and Beller (1989), and Reid and Mitchell (1995). The gap in administrative expenditures between public and private pension plans may be larger than described above, however, once different accounting systems in public versus private sectors are taken into consideration. Private pension systems are likely to report most administrative expenditures, including operating expenses and such expenses as building and capital depreciation, but these may not be properly accounted for by public pension plan administrations. Public plans might also understate their costs if they share equipment or offices with other

government branches. Hence administrative expenditures reported by public pension agencies almost certainly understate the full cost of resources devoted to providing pension services, a point that should be kept in mind when comparing the administrative efficiency of public and private pension systems; c.f. Reid and Mitchell (1995). The US \$130 median figure ( $= \exp(6.95)/\exp(8.94)$ ) in the text is higher than the average of US \$260 derived by dividing costs by participant by plan. Because outliers thus strongly influence the simple averages, we use medians in the discussion below.

13. Some may question whether the regression results are biased since some portion of the administrative costs are not fully reported in plans that have been partially or fully contracted out. However Paul Zorn (personal communication) suggests this is a modest problem, and we conclude that the regression results might be biased, but the bias is not serious.

14. These differences could also be the result of differences in model specification; for instance, collinearity between output levels of investment and non-investment services was not addressed by Mitchell and Andrews (1981).

15. The World Bank (1994) summarizes the case for privatizing or contracting out public pension plans. For a general discussion of public/private differences in the production process and their effects on incentive structures and monitoring see Hirsch (1991), who notes that owners of a private-sector production process have incentives to monitor quality because they can transfer their ownership and reap the residual profits. In the public sector, however, voters (owners of the public production processes) cannot generally transfer their ownership, which discourages profit seeking and hence monitoring. Although they can reap the residual profits in paying lower taxes, these profits must be shared with all the residents in a jurisdiction, regardless of whether they pay the costs of monitoring. As a consequence, the costs of producing goods may be higher in public than in private production. For a discussion of the impact of bureaucrats' behavior on efficiency see Niskanen (1971).

16. In alternate analyses (results not presented here) we estimated models which included fewer variables in the first-stage and more in the second-stage equation. However, results for included variables did not differ from those presented in Tables 1 and 2.

17. This computation uses median (unlogged) administrative costs per PERS of US \$1 million in 1994 ( $\exp 6.95$ ). Outliers make average administrative costs higher, at about US \$4 million but the text uses the more representative amount.

## References

- Aigner, Dennis, C.A. Knox Lovell, and Peter Schmidt. "Formulation and Estimation of Stochastic Frontier Production Function Models." *Journal of Econometrics* (1977) 6: 21-37.
- Bauer, Paul W. "Recent Developments in the Econometric Estimation of Frontiers." *Journal of Econometrics* 46, 1-2 (1990): 39-56.
- Berger, Allen N., J. David Cummins, and Mary A. Weiss. *The Coexistence of Alternative Distribution Systems for the Same Financial Services: The Case of Property-Liability Insurance*. Mimeo, Philadelphia: Wharton Financial Institutions Center, 1994.
- Bleakney, Thomas P. *Retirement Systems for Public Employees*. Homewood, IL: Pension Research Council and Richard D. Irwin, 1972.

- Caswell, Jerry W. "Economic Efficiency in Pension Plan Administration: A Study of the Construction Industry." *Journal of Risk and Insurance* 43 (1976): 257-73.
- Cooper, Robert D., Connie Ann Crabb, and Melody A. Carlsen. *Pension Fund Operations and Expenses—The Technical Report*. Milwaukee, WI: International Foundation of Employee Benefit Plans, 1984.
- Davis, Michael L. and Kathy Hayes. "The Demand for Good Government." *Review of Economics and Statistics* (1993): 148-52.
- Deller, Steven C. and Edward Rudnicki. "Managerial Efficiency in Local Government: Implications on Jurisdictional Consolidation." *Public Choice* 74 (1992): 221-31.
- Farrell, M. J. "The Measurement of Productivity Efficiency." *Journal of the Royal Statistical Society General Series A*, 120, 3 (1957): 251-83.
- Forsund, F. R., Christopher A. K. Lovell, and Peter Schmidt. "A Survey of Frontier Production Functions and of Their Relationship to Efficiency Measurement." *Journal of Econometrics* 13, 1 (1980): 5-25.
- Greene, William H. "Maximum Likelihood Estimation of Econometric Frontier Functions." *Journal of Econometrics* 13, 1 (1980): 27-56.
- Hayes, Kathy and Semoon Chang. "The Relative Efficiency of City Manager and Mayor-Council Forms of Government." *Southern Economic Journal* 57, 1 (1990): 167-77.
- Hirsch, Werner Z. *Privatizing Government Services: An Economic Analysis of Contracting Out by Local Governments*. Los Angeles: Institute of Industrial Relations, University of California, 1991.
- Hsin, Ping-Lung and Olivia S. Mitchell. "The Political Economy of Public Pensions: Pension Funding, Governance, and Fiscal Stress." In Patricio Arrau and Klaus Schmidt-Hebbel, eds., *Revista de Analisis Economico: Special Issue on Pension Systems and Reform* 9, 1 (June 1994): 151-68.
- James, Estelle and Robert Palacios. "Costs of Administering Public Pension Plans." *Finance and Development* (June 1995): 12-15.
- Jondrew, James, C.A. Knox Lovell, Ivan S. Materov, and Peter Schmidt. "On the Estimation of the Technical Inefficiency in the Stochastic Frontier Production Models." *Journal of Econometrics* 19 (1982): 233-38.
- Mitchell, Olivia S. "Retirement Systems in the Developed and Developing World: Institutional Structure, Economic Effects, and Lessons for Economies in Transition". In A. Van Adams, E. King, and Zafinis Tzannatos, eds., *Labor Market Policies for Managing the Social Cost of Economic Adjustment*. Washington, DC: World Bank, forthcoming.
- Mitchell, Olivia S. and Emily S. Andrews. "Scale Economies in Private Multi-Employer Pension Systems." *Industrial and Labor Relations Review* 34, 4 (1981): 522-30.
- Mitchell, Olivia S. and Ping-Lung Hsin. "Managing Public Sector Pensions". In John B. Shoven and Sylvester Schieber, eds., *Public Policy Toward Pensions*. New York: Twentieth Century Fund, forthcoming.
- Mitchell, Olivia S. and Ping-Lung Hsin. Public Pension Governance and Performance. NBER working paper, 1994.
- Mitchell, Olivia S. and Robert Smith. "Public Sector Pension Funding." *Review of Economics and Statistics* (May 1994).
- Mitchell, Olivia S., Annika Sunden, and Ping-Lung Hsin, "An International Comparison of Social Security Administration Costs" *International Compensation and Benefits* (1994).
- Mitchell, Olivia S., Annika Sunden, Ping-Lung Hsin, and Gary Reid. An Inter-

- national Appraisal of Social Security Administration Costs. Mimeo, Washington, DC: World Bank, 1993.
- Newhouse, Joseph. "Frontier Estimation: How Useful a Tool for Health Economics?" *Journal of Health Economics* 13 (1994): 317-22.
- Niskanen, William A., Jr. *Bureaucracy and Representative Government*. Chicago: Aldine-Atherton, 1971.
- Parsons, Donald O. "Recent Trends in Private Pension Coverage." Ohio State University, mimeo, 1992.
- Reid, Gary and Olivia S. Mitchell. Social Security Administration in Latin America and the Caribbean. Paper prepared for Public Sector Modernization and Private Sector Development Unit, The World Bank, March 1995.
- Skinner, Jonathan. "What Do Stochastic Frontier Cost Functions Tell Us About Inefficiency?" *Journal of Health Economics* 13 (1994): 323-28.
- Turner, John A. and Daniel J. Beller, eds. *Trends in Pensions 1989*. US Department of Labor. Washington, DC: USGPO, 1989.
- World Bank. *Averting The Old Age Crisis: Policies to Protect the Old and Promote Growth*. New York: Oxford University Press, 1994.
- Zorn, Paul. *Survey of State and Local Government Employee Retirement Systems: Data Base User's Guide*. Public Pension Coordinating Council, 1993.
- Zuckerman, Stephen, Jack Hadley, and Lisa Iezzoni. "Measuring Hospital Efficiency with Frontier Cost Functions." *Journal of Health Economics* 13 (1994): 255-80.