



## **Economies of Scale and Pension Fund Plans: Evidence from South Africa**

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# Economies of Scale and Pension Fund Plans: Evidence from South Africa\*

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## Abstract

The focus of this paper is on the presence of economies of scale in administering pension funds. We make use of a unique dataset with extensive information on South African retirement funds from 1996 to 2006. For almost fifty years now, South Africa has operated under a system with small social security benefits but with considerable options and freedom to long-term savers. The dataset contains aggregate information for various fund types, fund classes, as well as different benefit structures. Estimates of a translog cost function provide evidence of unused economies of scale in the industry. We also find that established funds have a substantial cost-advantage over young funds.

**JEL Codes:** G23, H55, L13

**KEY WORDS:** Economies of scale; Defined contribution; Pay as you go; Learning-by-doing; Annuitization.

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# 1 Introduction

Since the mid-1990, many Western countries have adopted measures to shift their pension system towards defined-contribution (DC) occupational schemes, and away from expensive pay-as-you-go (PAYG) state pensions. These reforms are intended to address challenging demographic and economic conditions in the form of population ageing and skyrocketing public indebtedness. The pension structures that are emerging involve a greater reliance on private sector provision, and call on individuals to bear more of the investment risk. In counterpart, these changes should bring substantially higher rates of return than PAYG plans, and consequently they should provide higher benefits during retirement (see Feldstein and Rangelova, 2001).

One important issue for policymakers and practitioners has been the lack of comprehensive studies of international experiences with DC-dominated pension system. Part of the uncertainty pertains to the consequences of the individuals newly found freedom. For example, it is unclear how shifting the decisions on annuitization back to fund-participants will affect operating expenses.<sup>1</sup> While theories of financial intermediation root the existence of pension funds to the presence of fixed transaction costs (Freixas and Rochet, 1999), they offer few insights regarding which pension system is superior to achieve scale economies. We contribute to the literature by documenting the South African experience.

This article examines economies of scale in pension administration in South Africa, and the role of plan design. For almost fifty years now, South Africa has operated under a pension system with small social security benefits but with considerable options and freedom for long-term savers. For instance, it is one of few countries in the world that allow fund-participants complete flexibility regarding annuitization decisions (Antolin and Stewart, 2008). For the majority of people, membership in a pension fund is not compulsory except in occupations where such a fund exists. Hence, occupational funds are the primary retirement vehicle for workers in the country. Other ways to accumulate long-term savings include individual retirement annuity policies and mutual fund products which enjoy similar tax deductions as occupational retirement funds. Section 2 presents an overview of the retirement industry in South Africa.

Administrative efficiency is a key objective for any pension system. In fact, high administrative costs can absorb the difference in rates of return between defined contribution (DC) and PAYG pension plans. In the case of defined benefit funds (DB), high administrative costs can reduce retirement income, and impoverish the sponsor as well. In South Africa, annual administrative expenses typically lie between

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<sup>1</sup>In this paper, we will use “annuitisation” and “payout options” as synonyms to describe how members receive their benefit on retirement.

0.37% and 0.73% of pension fund assets per year in 2003 (Rusconi, 2004). It corresponds to between 6% and 12% of total annual contributions. The question we address is whether least-cost provision of pension services is achieved by having relatively fewer, but larger pension funds.

We make use of a unique dataset with extensive information on pension funds from 1996 to 2006. The dataset contains aggregate information for various types and classes of fund, as well as different benefit structures. Our results show that there are between 25%-30% of unused scale economies in the pension fund industry. However, the potential to reduce costs has been increasing over time. We also find that established funds have a substantial cost-advantage over young funds. We attribute this result to learning by doing gains through experience in the industry, as well as a higher concentration among old funds. This result is important to the extent that there is scope for funds to improve efficiency over time through both accumulate knowledge and experience from learning about individuals' behaviors. This dimension is new to countries that recently moved to DC pension systems. To the best of our knowledge this effect is not acknowledged in the literature.

The literature on economies of scale in the South African pension fund industry is scarce. A notable exception is the work of Rusconi, presented in October 2004 at the Convention of Actuarial Society of South Africa. The main focus of this study is to elicit the cost for members of their retirement funding, and to compare it with other countries. Rusconi (2004) also finds evidence of a strong scale effect in administering retirement funds. However, this study suffers from serious data limitations, as it relies solely on a cross-section of a small sample of pension funds (242 funds covering a total of 127,450 members). The present study departs from Rusconi (2004) in several ways. First, the dataset used is more representative of the industry as it contains all the funds that report to the regulatory agency. Second, the data are available for a longer period. Third, given the richness of the dataset we are able to use a more robust technique to estimate the cost function of the industry. More specifically, our methodology is closely related to Bikker and Dreu (2009), who studied the efficiency of the Dutch pension funds.

The remainder of the paper is organized as follows. Section 3 describes our data set. The methodology and the results come in section 4 and section 5, respectively. We conclude in section 6.

## 2 Overview of the retirement industry in South Africa

The early history of pension savings in South Africa coincides with that of the insurance industry. Life insurance policies had long been the main way to accumulate long term savings in the country. The oldest life insurer still in action – The South African Mutual Life Assurance Society, today’s Old Mutual was founded in 1846 (Falkena *et al.*, 1986). It was only in 1956 that the Pension Funds Act was promulgated to define the activities of pension funds as opposed to the business of insurers. The Act was amended subsequently, including in 2001 so as to make new provision for the apportionment of actuarial surpluses and for minimum benefits; and to provide for matters related therewith.

Based on the OECD taxonomy, the South African pension system can be decomposed into three tiers. The first tier is constituted essentially of a means-tested social assistance scheme called State Old Age Grant (SOAG). The SOAG seeks to alleviate poverty among the older population, by targeting individuals with no income in retirement. In 2008, as many as 2.23 millions individuals received a grant under this arrangement. It is reminiscent of the high level of poverty in the country.<sup>2</sup> The second tier exists only for civil servants; this is the Government Employees Pension Fund (GEPF), which is a defined-benefit (DB) fully funded system.

Finally, the third tier is constituted of both occupational pension schemes as well as private retirement savings schemes. Participation to a retirement scheme is not mandatory in South Africa but individuals are provided with tax concessions to accumulate capital through various arrangements.<sup>3</sup> Membership in a pension fund is only obligatory in occupations where such a fund exists. This segment of the retirement system is well developed, but it has a limited coverage of the employed population. For instance, in 2005 only 48% or 5.9 million of the total working population were member of a retirement fund. Funds in this segment are supervised by the Financial Service Board (FSB).

The focus of this paper is on the third tier. In 2007, there were about 13,000 retirement funds in South Africa, of which an estimated 4,000 were dormant funds. There is a broad variety of schemes within this segment of the retirement system. An elementary classification of schemes in South Africa distinguishes

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<sup>2</sup>In 2004, more than 34% of the population was living with less than \$2 a day.

<sup>3</sup>Pension benefits are taxed as earned income. A portion of lump-sum benefits at retirement is tax-exempt. The tax-free portion is one-tenth of the highest 5 consecutive years average annual salary (with a maximum of R60,000) times years of membership (with a maximum of 50 years taken into account). This tax-free amount is limited to the greater of R120,000 or R4,500 times years of membership. The remaining portion of the lump sum is taxed as earned income.

between provident funds and pension funds. The main distinction pertains to how the member receives its benefit on retirement. A pension fund provides at least two-third of the pension benefits as a monthly income until the member dies, and the remaining portion is paid out as a lump-sum. A provident fund, on the other hand, pays out the entire benefit as a lump-sum when the member leaves the fund. Provident funds represent a larger fraction of active funds than pension funds. Retirement annuity funds offer additional payout options.

Retirement funds are classified as private or underwritten funds. Underwritten funds can only invest in insurance policies, while private funds are permitted to invest in any assets subject to the provisions of the Pension Funds Act. Smaller companies and the self-employed will generally have an underwritten fund as primary retirement vehicle, while the employed will use it as a secondary retirement vehicle. Until 2005, underwritten funds were not required to report to the FSB, therefore avoiding significant costs. In 2007, more than 80% of funds in the third tier had fewer than 50 members, and tended to be underwritten funds.

Despite the limited coverage of the working population, the retirement industry constitutes the most important (domestic) source of capital for the economy. In 2005, for instance, the total net assets of the industry was about 80% of the GDP, that is R1.284 trillion.<sup>4</sup>

### 3 Data

The data for this study have been made available by the FSB. They are drawn from the pool of pension funds falling under its regulatory responsibility during the period 1996 to 2006. It gives a detailed breakdown of administrative expenses, membership, as well as contributions and benefits to the fund. Information about the fund type, fund class, fund status, benefit structure and level of assets are also available.<sup>5</sup>

Our working sample consists of 13,652 data points. The dataset is an unbalanced panel as the industry recorded new entries, mergers or closures over the period of the study. We do not include underwritten funds as they only started reporting to the FSB in 2005. Excluding underwritten funds eliminates most of

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<sup>4</sup>On the 18 November 2010, 1 euro = 9.5 Rand.

<sup>5</sup>However, the data is likely to have some drawbacks. The lack of uniformity in the measurement/classification of some costs among funds can be a problem. In addition, the costs incurred by the sponsoring employer in support of the employees' pension fund are not always passed on to the fund.

Table 1: Administrative costs by size (2006)

Variables	Administrative expenses/total assets (%)	Administrative expenses per member	Total assets per member (1,000 Rand)	Total number of members (1,000)	Number of pension funds
Number of members					
0-100	1.63	3,065	443	19	409
100-1,000	0.94	1,127	265	264	702
1,000-10,000	0.64	626	250	821	298
10,000-100,000	0.59	386	236	1,078	44
>100,000	2.24	76	4	1,181	5
Average/total	1.21	1,056	239	3,363	1,458
Total assets (million Rand)					
0-10	2.10	3,049	252	32	271
10-1,00	0.80	2,450	457	351	684
1,00-1,000	0.38	1,331	438	1,368	415
1,000-10,000	0.24	855	610	1,236	79
>10,000	0.08	428	508	376	9
Average/total	0.72	1,623	453	3,363	1,458

Source: Auhitors' calucaltion based on FSB data.

the small (and potentially inefficient) pension funds, and creates a selection bias. The exercise conducted in this paper, however, informs the “best practice” in South Africa.

*Table 1* reports the (weighted) average of administrative costs for different size categories in 2006, as proxied by the number of members and the level of assets, respectively. A couple of points are worth stressing about *Table 1*. First, notice that as the fund size increases the average administrative expenses per member decreases sharply. When the fund size is captured by the number of members, the average administrative expenses per member goes from R3,065 for funds with fewer than 100 members, to R76 for funds with more than 100,000 members. When using total assets to measure the fund size, the average administrative costs per member was R3,049 for funds with less than 100 million Rand of total assets compared to R428 for retirement funds with more than 100 billion Rand worth of assets.

Secondly, on average the administrative expenses per rand of asset decreases significantly across total asset categories, from 2.10% for the smallest retirement funds to 0.08% for the largest ones. The negative relationship between average administrative costs over total assets and fund size is confirmed across categories of total members. The only exception is the largest category, which displays the highest percentage at 2.24%; but it cannot be dissociated from the fact that the level of total assets per member appears to

Table 2: Administrative costs by type and by class of fund, and by benefit structure (2006)

Variables	Administrative expenses/total assets (%)	Administrative expenses per member	Total assets per member (1,000 Rand)	Total number of members (1,000)	Number of pension funds	Average number of members
Type of pension fund						
Ordinary	1.05	2,392	422	2,807	1,325	2,119
Preservation	1.02	4,104	575	18	22	811
Umbrella	2.17	1,232	146	537	111	4,841
Average/total	1.41	2,576	381	3,363	1,458	2,590
Class of fund						
Pension	0.96	2,524	494	1,682	771	2,182
Provident	1.35	2,115	301	1,664	671	2,480
Retirement annuity	0.60	1,952	334	16	16	1,014
Average/total	0.97	2,197	376	3,363	1,458	1,892
Benefit structure						
Defined benefit	0.88	5,323	942	625	235	2,659
Defined contribution	1.215	1,680	289	2,583	1,166	2,215
Hybrid	0.61	2,331	535	138	38	3,628
Average/total	0.90	3,105	589	3,346	1,439	2,834

Source: Auhtors' calucaltion based on FSB data.

be extremely low for this category of retirement funds. The analysis of these descriptive statistics suggests the presence of important economies of scale in the pension fund industry.

In *Table 2*, we break down administrative expenses for various fund types and classes, as well as for different benefit structures. Notice the dominance of DC funds with a total of 1,166 funds and more than 75% of total members. Unlike the other fund types, more than one employer can participate in an umbrella fund. Thus, there is scope for scale economies in terms of reporting costs with this type of arrangement. This is apparent in the average expenses per member in our sample. For members in an umbrella fund the average administrative expenses were R1,232 in 2006 compared to more than R2,392 for individuals in ordinary funds or in preservation funds. However, the ratio of administrative costs per total assets of umbrella funds is the highest among the three types of fund at 2.17%.

On average, less money is spent per member to administer provident funds compared to pension funds. It is to be expected as provident funds pay out the entire benefit as a cash lump-sum when a member leaves the fund, thereby stopping administration at retirement. Pension funds, on the other hand, offer a monthly pension income in addition to making a lump-sum payment. However, administrative expenses over total assets is higher for provident funds at 1.35% in 2006 compared to 0.96 for pension funds. This is



in part explained by the fact that the concentration of provident funds is highest in the blue-collar segment of the working population, particularly industry and union funds. Thus, it is not clear whether provident funds enjoy some sort of advantage.

Retirement annuity funds, on the other hand, enjoy the lowest administrative expenses both per member and per total assets. This outcome is surprising, because retirement annuity funds collect contributions via direct debit from each member’s bank account; one would have expected this to be more expensive than leveraging off payroll systems, as both occupational pension and provident funds do. The level of aggregation in our dataset is too high to fully account for the singularity of each fund type as there exists a wide variety of products among pension, provident and annuity funds; and this is also true for the benefit structure.

## 4 Methodology

To examine economies of scale in pension administration we exploit the variation in our data for two samples: the overall South African retirement industry and the group of funds that report to the FSB continuously over a period of 11 years (henceforth “11-year funds”). Two reasons justify looking at the “11-year funds”. First, in order to overcome data issues caused by misreporting. Second, the latter group probably gives a more accurate representation of the efficiency of the pension fund industry. Both their longevity and their ability to report regularly suggest that they have an “absolute cost-advantage” which allows them to survive entry and competition in the industry (see Tirole, 1988 pp. 306). They account for approximately a third of the members in the full sample. Only one the four biggest funds (more than 100,000 members) in number of members is part of this sub-sample. However, eight out of nine of the biggest funds in total assets (more than R10 trillions) belong to the “11-year funds” sub-sample.

The cost function of the typical retirement fund is modeled as a translog function. The translog function embodies the notion that expenses are expected to vary with two outputs, investment activities and services to participants in the pension plan. This formulation is often used to identify scale effects (see for example Mitchell and Andrews, 1981). We postulate the following linear form:

$$\ln Cost_{it} = \alpha_0 + \alpha_1 \ln Members_{it} + \alpha_3 Assets + \sum_j \alpha_j X_{jit} + \varepsilon_{it} \quad (1)$$

where  $Cost$  is the fund’s administrative expenses,  $Members$  is the total number of participants in the fund which we use as our scale variable in order to focus on service activities to participants.  $Assets$

is level of assets per member.  $X_j$  is a set of control variables, and the error term is represented by  $\varepsilon$ . Included in the vector  $X_j$  are fund characteristics, other than size, that may affect costs (fund type, benefit structure, membership repartition between pensioners, beneficiaries, etc ...).  $Eq.(1)$  will serve as the basis of multivariate regressions.

The presence of economies of scale is captured by the coefficient  $\alpha_1$ . When  $\alpha_1$  is less than one, the industry operates below the constant-returns-to-scale value of one and there are potential efficiency gains to be made from increasing pension fund size. When  $\alpha_1$  is greater than one, the industry operates with decreasing returns to scale.

We also allow scale economies to vary with the fund size by introducing a squared term into  $Eq.(1)$ . This specification is useful to determine the “optimal” fund size.

$$\ln Cost_{it} = \alpha_0 + \alpha_1 \ln Members_{it} + \alpha_2 (\ln Members_{it})^2 + \alpha_3 Assets + \sum_j \alpha_j X_{jit} + \varepsilon_{it} \quad (2)$$

We estimate the linear models in  $Eq.(1)$  and  $Eq.(2)$  using two techniques. First, we run an OLS of the system of independent equations to estimate the effect of size and plan design on administrative expenses. We control for time fixed effects. Second, we run the Seemingly Unrelated Regressions (SUR) technique (Zellner, 1962). The SUR technique is more appropriate to account for the cross-equation restrictions as well as the pooled cross-sectional and time series nature of our data. Using the SUR technique in STATA requires a balanced-panel; only the “11-year funds” sub-sample fits this requirement (see *Figure 2*).<sup>6</sup>

## 5 Results

In this section, we look to find more support for the presence of a size effect in the pension fund industry in South Africa. We run several regressions based on  $Eq.(1)$  and  $Eq.(2)$  for the overall South African retirement industry and for the “11-year funds”, respectively. The estimates for the administrative costs model are presented in *Table 3*. In the regression, the reference categories are: ordinary, pension, defined contribution, for fund type, fund class and benefit structure, respectively.

For the full sample, the fund size explain 59% of the variation in administrative expenses. The scale coefficient  $\alpha_1$  is significantly lower than one.<sup>7</sup> In other words, increasing the number of members will

<sup>6</sup>The results with the SUR technique are available upon request. All our (qualitative) findings are robust to the use of the SUR technique.

<sup>7</sup>Recall that a coefficient below one implies increasing returns to scale, a coefficient above one implies decreasing returns

Table 3: Estimates for the administrative costs model (1996-2006)

Dependent variable: <i>ln Admin costs</i>	All pension funds				11-year funds	
	1996-2006		2006		1996-2006	
	Linear	Quadratic	Linear	Quadratic	Linear	Quadratic
Total members (in logs)	0.697 (0.007)***	0.493 (0.031)***	0.690 (0.096)***	0.758 (0.010)***	0.508 (0.046)***	
Total members (in logs), squared	-	0.018 (0.002)***	-0.009 (0.008)	-	0.020 (0.004)***	
Preservation	0.865 (0.094)***	0.807 (0.097)***	0.333 (0.366)	-0.118 (0.251)	-0.091 (0.252)	
Umbrella	-0.231 (0.039)***	-0.245 (0.039)***	-0.161 (0.150)	-0.250 (0.080)***	-0.263 (0.079)***	
Provident	-0.053 (0.021)***	-0.061 (0.021)***	0.013 (0.080)	-0.166 (0.032)***	-0.157 (0.032)***	
Retirement annuity	0.313 (0.113)***	0.323 (0.114)***	-0.222 (0.394)	-0.174 (0.193)	-0.143 (0.197)	
Defined benefit	0.277 (0.032)***	0.271 (0.028)***	0.015 (0.118)	0.307 (0.040)***	0.307 (0.039)***	
Hybrid	0.465 (0.056)***	0.454 (0.055)***	0.426 (0.245)	0.324 (0.083)***	0.285 (0.082)***	
Total assets (in R10,000) per member	0.001 (0.000)***	0.001 (0.000)***	0.003 (0.000)***	0.003 (0.000)***	0.003 (0.000)***	
Percentage deferred members	-0.001 (0.002)	-0.003 (0.002)	0.008 (0.002)***	-0.001 (0.002)	-0.002 (0.002)	
Percentage pensioners	0.006 (0.001)***	0.006 (0.001)***	0.004 (0.002)**	0.003 (0.001)***	0.003 (0.001)***	
Percentage beneficiaries	0.012 (0.002)***	0.011 (0.002)***	0.008 (0.007)	0.009 (0.003)***	0.008 (0.003)***	
Percentage unclaimed benefits	-0.008 (0.002)	-0.010 (0.003)	-0.001 (0.003)	-0.023 (0.005)***	-0.024 (0.005)***	
Constant	8.856 (0.046)***	9.388 (0.099)***	8.653 (0.283)**	8.630 (0.061)***	9.342 (0.143)***	
Observations	13,652	13,652	1,439	4,895	4,895	
R-squared	0.59	0.60	0.38	0.68	0.68	

Notes: \*\*\*, \*\* denote significantly different from zero at the 99% and 95% confidence interval, respectively (for the scale coefficient, significantly different from 1). Standard errors are corrected for heteroskedasticity and reported in parentheses.

increase administrative costs by less than proportionally. Based on the linear model (first column), there exists as much as 30% of unused scale economies in the pension fund industry in South Africa. In other words, a 1% increase in the number of members, holding assets constant, would raise administrative expenses by only 0.696%. For comparison, Bikker *et al.* (2010) estimate the scale coefficient for Australia (0.739), Canada (0.945), the Netherlands (0.691) and the United States (0.788). Their study also excludes small funds so that the scale coefficients are comparable to our finding.

For the sub-sample of “11-year funds”, the scale coefficient is higher, as one would have expected, at 0.758 (third column). Moreover the R-squared of the regression is increased from 0.59 to 0.68.<sup>8</sup> It seems that established funds are enjoying a substantial advantage that make them cheaper than “recent” pension funds. This result is robust to the the period funds appear in the dataset (see for example *Figure 3* in the Appendix). We interpret this result as evidence of learning by doing in the industry. In fact, in many industries learning through production experience or learning by doing enables firms to reduce costs (see for example Lewis and Yildirim, 2002). Given the long-term nature of the fund-individual relationship, there is scope for “old funds” to accumulate information relevant to the provision of retirement services. This feature is more valuable in pension systems that give individuals room to make important decisions such as assets allocation or annuitization.

The significance of the squared term in the quadratic model (third column) suggests that economies of scale in the industry decrease as the retirement fund size increases. Based on the estimate of the quadratic model, optimal size is obtained at 220,000 members (see *Figure 1*). For the South African pension system as a whole, this number is a lower bound because the average pension fund is less efficient than what we estimated using both sub-samples in this study.

Results for plans design are also informative. First, defined benefit plans are found to have one-third (0.277) higher administrative expenses than both defined contribution plans and hybrid plans. Bateman and Mitchell (2004) found a similar coefficient for Australia (0.335) which has several similarities with the South African pension system. Second, provident funds have lower costs than both pension funds and retirement annuity funds, even after controlling for the level of assets per member. The coefficient of the provident dummy is significantly negative in all the regressions. However, the difference in costs is rather

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to scale, while constant returns to scale are obtained when cost elasticities equals one.

<sup>8</sup>The scale coefficient falls to 0.709 for the sub-sample of funds that reported to the FSB between 9 and 11 years over the period of the study; and the R-squared of the regression is 0.61.

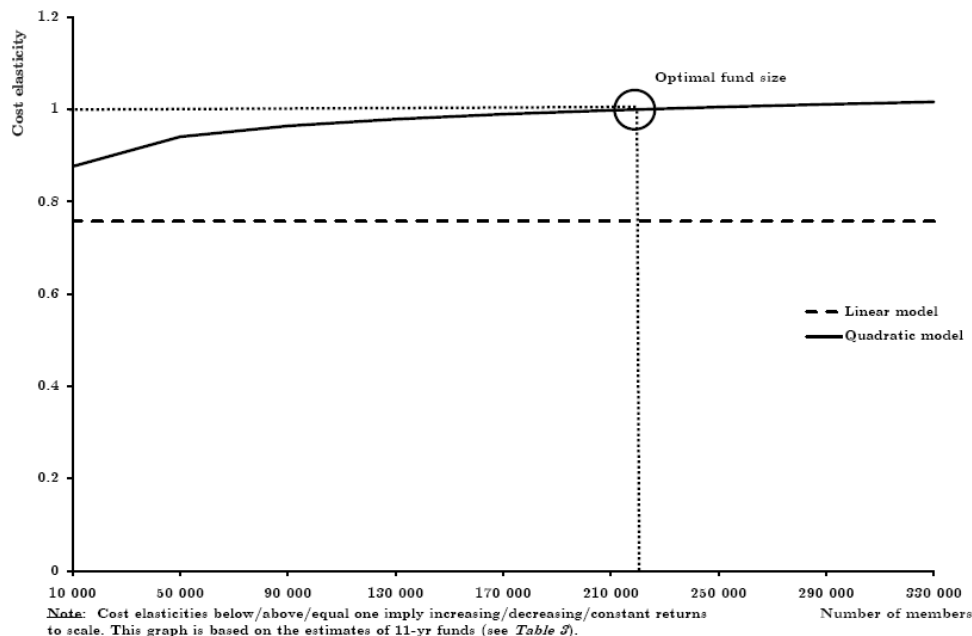


Figure 1: Optimal fund size

small between paying out the benefits at retirement as a lump-sum (provident funds) or monthly payment (pension funds).

Notice that the coefficient on the retirement annuity dummy is relatively high and highly significant. That is, after controlling for differences in fund types, benefit structures as well as fund sizes, retirement annuity funds are relatively expensive options. This result suggests that collection costs are important to explain the different in administrative costs. Third, the analysis for provident funds also applies to umbrella funds as they also enjoy less administrative expenses on average with a level of assets per member lower than both ordinary funds and preservation funds. As pointed out in the previous section, umbrella arrangements generate economies of scale in administration but this might be offset by insufficient scale economies. A high enough asset level is required to generate economies of scale in the investment activities of a retirement fund.

## 5.1 Evolution of scale economies between 1996 and 2006

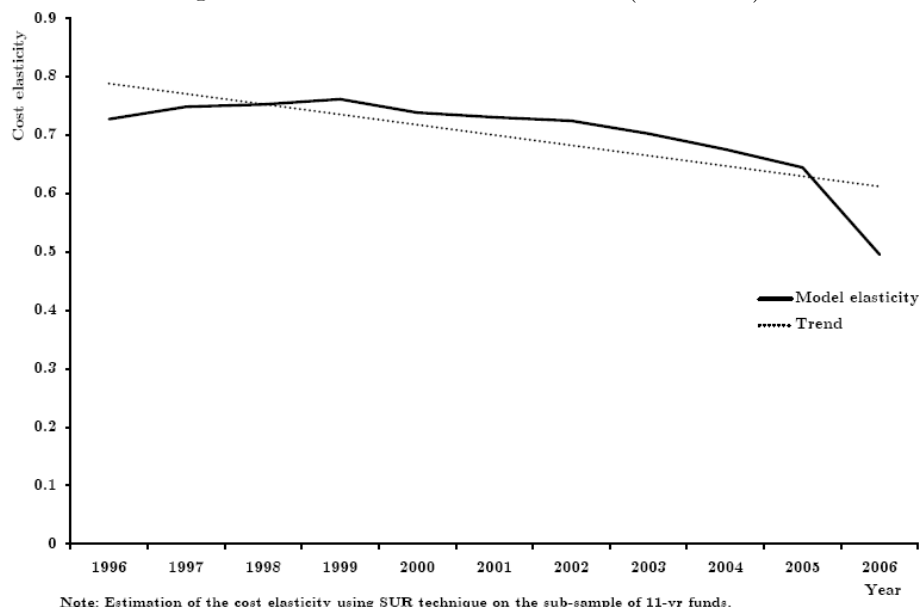
In *Figure 2*, we present the evolution of the scale economies over the period 1996 to 2006. The graph of the scale coefficient displays a downward sloping trend. In other words, the industry has become less

Table 4: Estimates for the administrative costs model with a dummy for 2001 onwards (1996-2006)

Dependent variable: <i>ln Admin costs</i>	All pension funds		11-year funds	
	Linear	Quadratic	Linear	Quadratic
Total members (in logs)	0.690 (0.007)***	0.493 (0.032)***	0.754 (0.008)***	0.522 (0.046)***
Total members (in logs), squared	-	0.017 (0.003)***	-	0.019 (0.004)***
Preservation	0.928 (0.094)***	0.872 (0.096)***	-0.105 (0.262)	-0.080 (0.263)
Umbrella	-0.167 (0.039)***	-0.180 (0.040)***	-0.229 (0.079)***	-0.241 (0.079)***
Provident	-0.055 (0.021)***	-0.062 (0.021)***	-0.155 (0.031)***	-0.147 (0.031)***
Retirement annuity	0.335 (0.110)***	0.345 (0.110)***	-0.141 (0.183)	-0.113 (0.187)
Defined benefit	0.251 (0.031)***	0.246 (0.030)***	0.263 (0.038)***	0.264 (0.037)***
Hybrid	0.435 (0.054)***	0.425 (0.053)***	0.316 (0.077)***	0.280 (0.076)***
Total assets (in R10,000) per member	0.001 (0.000)***	0.001 (0.000)***	0.004 (0.000)***	0.003 (0.000)***
Percentage deferred members	-0.001 (0.002)	-0.002 (0.002)	0.00 (0.002)	-0.001 (0.002)
Percentage pensioners	0.006 (0.001)***	0.006 (0.001)***	0.004 (0.001)***	0.004 (0.001)***
Percentage beneficiaries	0.011 (0.002)***	0.009 (0.002)***	0.009 (0.002)***	0.007 (0.002)***
Percentage unclaimed benefits	-0.003 (0.002)	-0.005 (0.002)	-0.015 (0.005)***	-0.016 (0.005)***
Dummy = 1 for 2001-2006	-0.507 (0.019)***	-0.504 (0.019)***	-0.511 (0.026)***	-0.507 (0.026)***
Constant	9.221 (0.047)***	9.729 (0.101)***	8.911 (0.061)***	9.568 (0.144)***
Observations	13,652	13,652	4,895	4,895
R-squared	0.61	0.62	0.70	0.70

Notes: \*\*\*, \*\* denote significantly different from zero at the 99% and 95% confidence interval, respectively (for the scale coefficient, significantly different from 1). Standard errors are corrected for heteroskedasticity and reported in parentheses.

Figure 2: Evolution of scale economics (1996-2006)



efficient over the period 1996-2006.

Such efficiency loss can occur as a result of a dilution of market shares, and a reduction of the average fund size (away from the optimal size). *Figure 3* depicts the evolution of the Herfindahl-Hirschman concentration indices (HHIs) over the period of interest. The label “9-11 year funds” designates the group of pension funds that are in the dataset for at least 9 years. As expected, consolidation is the highest among the group of pension funds in the “11 year funds” sub-sample, but this concentration decreases over the period. This is also the case for the entire industry. Despite a slight movement toward concentration since 2004, the industry is far from its 1996 level. Thus, it seems that some of the efficiency losses can be attributed to a fall in the market concentration between 1996 and 2006.

Another reason for the efficiency losses could be a change in the regulation. In 2001, significant regulatory changes were introduced that had numerous repercussions on the reporting method to the FSB. To test this hypothesis within the framework of this study, we introduce a dummy variable that takes the value 1 from 2001 onward and zero otherwise. The coefficient of the dummy is significant, that is, changes that occurred in 2001 explain administrative expenses.

## 6 Conclusion

This study documents the extent to which efficiency gains can be made in administering pension funds in South Africa. We find that:

- There are between 25%-30% of unused scale economies in the pension fund industry, with an optimal fund size at around 220,000 members.
- Old funds appears to be more efficient than young funds because of relatively higher market concentration as well as more experience in the industry.
- The potential to reduce costs has been increasing over time as we observe a dilution of the market shares since 2006.
- Umbrella arrangements are conducive of economies of scale in administration expenses but not necessarily in investment activities.
- Collection costs are important to explain high administrative costs.

The issue of the presence of economies of scale in the pension fund industry is of concern in determining appropriate regulatory policy toward fund creation, acquisitions and mergers, as well as in predicting future industry structure. Since economies of scale exist in the industry, least-cost provision of pension services would be accomplished by having relatively fewer, but larger pension funds. Competitive market forces have not contribute to further consolidation of pension funds. Thus, one way to achieve least cost provision is for the regulator to implement policies (such as an entry fee) so that only larger and more cost-efficient funds are left. Additional research is needed in order to account for each industry specificity.

In addition, the non-compulsory nature of the South African pension system is more likely to make it more expensive. Additional costs include marketing costs by providers, an additional need for underwriting, or more scope for anti-selection.<sup>9</sup>

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<sup>9</sup>That is, individuals with longer life expectancy are more likely to purchase annuities.



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Table 5: Administrative costs by size for 11-year funds (2006)

Variables	Administrative expenses/total assets (%)	Administrative expenses per member	Total assets per member (1,000 Rand)	Total number of members (1,000)	Number of pension funds
Number of members					
0-100	1.02	3,678	629	5	102
100-1,000	0.66	1,165	307	90	220
1,000-10,000	0.35	500	327	297	108
10,000-100,000	0.16	413	374	535	19
>100,000	0.48	25	5	228	1
Average/total	0.53	1,156	328	1,155	450
Total assets (million Rand)					
0-10	1.54	4,773	341	3	38
10-1,00	0.70	3,050	606	65	211
1,00-1,000	0.28	1,011	442	263	156
1,000-10,000	0.13	749	688	469	37
>10,000	0.09	463	494	356	8
Average/total	0.55	2,009	514	1,155	450

Source: Auhators' calucaltion based on FSB data.

Table 6: Administrative costs fund type, fund class, and by benefit structure for “11-year funds” (2006)

Variables	Administrative expenses/total assets (%)	Administrative expenses per member	Total assets per member (1,000 Rand)	Total number of members (1,000)	Number of pension funds	Average number of members
<b>Type of pension fund</b>						
Ordinary	0.65	2,383	510	1,103	435	2,536
Preservation	0.37	853	319	0	2	161
Umbrella	0.67	703	156	52	13	3,979
Average/total	0.56	1,313	329	1,155	450	2,225
<b>Class of fund</b>						
Pension	0.58	2,356	594	840	234	3,590
Provident	0.72	2,288	398	310	213	1,455
Retirement annuity	0.76	2,970	308	5	3	1,770
Average/total	0.69	2,538	433	1,155	450	2,272
<b>Benefit structure</b>						
Defined benefit	0.50	4,808	1,050	384	91	4,222
Defined contribution	0.70	1,477	331	648	336	1,929
Hybrid	0.41	1,897	671	121	18	6,708
Average/total	0.53	2,727	684	1,153	445	4,286

Source: Auhators' calucaltion based on FSB data.

Figure 3: HHI of concentration between 1996-2006

