Theoretical and Applied Economics
Volume XVIII (2011), No. 3(556), pp. 107-116

An Analysis of the Correlation between Size and Performance of Private Pension Funds

Vasile ROBU
Bucharest Academy of Economic Studies
robuv2002@yahoo.com
Maria Iuliana SANDU
Bucharest Academy of Economic Studies
maria_iuliana_sandu@yahoo.com

Abstract. *Using present performance measures, we find that inflation rate is barely covered by Romanian private pension funds strategies. The paper looks at effects of scale on performance. This issue is investigated empirically using data from Romanian private pension funds. We find results consistent with prior literature in that size, measured as total net assets, erodes performance. The highly regulated Romanian private pension environment gives rise to various interpretations for size detracting performance that do not sprout from the "asymmetric information" theory. We explain the empirical results as an effect of "perfect scaling".*

Keywords: performance; scale; private pension market; panel data; perfect scaling.

JEL Codes: G2, G23, L2, L25.
REL Code: 11B.

1. Introduction

Still in the accumulation phase, the Romanian private pension industry ends year 2010 with approximately € 1,109.5 million in net assets, approximately 1% of GDP, with an increase of 80% compared with December 2009. Romania follows a multi-pillar system recommended by the World Bank that makes a distinction between privately managed pensions funds and optional pensions. If we also count "siblings" of same "family" fund (i.e., *ING* private managed pension fund, *ING Optim* – optional pension fund, *ING Activ* – optional pension fund) there are 9 privately managed pension funds and 13 optional pension funds. The Romanian private pension market is closely regulated by the Commission for Private Pension System Supervision (*CSSPP* hereinafter). Among other things, *CSSPP* strictly regulates the nature and limits of pension funds investments and, therefore, most of the funds are placed in secure assets as bank deposits, municipal bonds, and corporative bonds. This paper investigates how size influences the performance of a pension fund.

Theory of financial intermediation, which focuses mainly on banks, sees activities like taking deposits and issuing loans as defining the financial intermediary role. Expanding the theory of financial intermediation to pension funds activities, Davis (2000) sees pension funds as forms of institutional investors, which collect, pool and invest funds contributed by sponsors and beneficiaries to provide for the future pension entitlements of beneficiaries. Consequently, pension funds fulfill a role of financial intermediary by investing money accumulations into a variety of financial assets (e.g. corporate equities, government bonds, real estate, corporate debt, foreign instruments, and deposits).

Pension funds as financial investors could provide for various advantages such as better trade-off of risk and return through diversification and lower transaction costs (or in short economies of scale) as they trade in large volumes. In the real-world market, because of features like transaction costs and asymmetric information, pension funds benefit from declining average trading costs, fixed costs of evaluating assets, and technological advances.

Chen et al. (2004, pp. 1276-1302) explain the inverse relationship between scale and fund returns as a low liquidity implication according to which the size might affect performance much more for funds that invest in illiquid stocks. Furthermore, they hypothesize that a possible explanation for size affecting negatively the performance is related to certain organizational diseconomies. In their view, managers of larger funds[(1)] with complicated hierarchies have to follow many procedures before implementing an idea and loose valuable time in complying with all the bureaucratic requirements. For these reasons, large funds can present an inverse relation between total assets under management and performance.

Chen et al. (2004, pp. 1276-1302) findings are consistent with prior research. In a literature review, Clark (1988, pp. 16-33) identifies a pattern in the empirical studies on scale economies, consequently, that economies of scale appear to exist only at *low* levels of output (below $ 100 million in deposits) with diseconomies of scale at *large* output levels (above $ 100 million in deposits). Chan et al. (2009, pp. 73-96) also address the impact of size on performance and argue that mutual fund size effects are caused by transaction costs. They use a unique data base containing transactions information in order to compare the activity of large and small managers. As expected, large funds(3) have higher transaction costs and a size that detracts from the performance of the fund.

Pollet and Wilson (2008, pp. 2941-2969) suggest that diversification is a solution to funds suffering from diminishing returns to scale. They document that large funds(4) appear to be “very reluctant to diversify in response to growth but instead tend to acquire ever larger ownership shares in the companies they already own”. Furthermore, fund family has an additional effect in the rapidness of the diversification suggested as funds with many siblings diversify investments at a slower pace than the rest of the families. Instead of diversifying, family funds choose to focus funds on fewer stocks.

Yan (2008, pp. 741-768) findings are consistent with Chen et al. (2004, pp. 1276-1302) in that liquidity (measured based on bid-ask spreads) is a possible explanation for the inverse relation between fund size and fund performance. Nevertheless, these findings refer to actively managed equity mutual funds and although we can see pension funds having similar features with pension funds, due to the strict investment restrictions of *CSSPP*, we are reserved in considering any Romanian pension fund as an actively managed financial institution.

Following previous research (Chen 2004, pp. 1276-1302, Bauer 2010), we test whether there is a negative association between size, measured as total net assets, and performance for funds after a certain threshold.

The paper proceeds as follows. In Section 2 we describe the data. Section 3 includes the methodology applied and Section 4 has the empirical findings. We conclude in Section 5.

2. Data

We use publicly available *CSSPP* data base and we take all the funds that have *rates of return* available. Because June 2008 was the starting point for the Romanian private pension market and because the growth rates of unit value of funds, or so called *rates of return*, are computed for a period of 24 months, the data available for analysis spans from June 2010 to December 2010 summing up seven months of data for 17 pension funds. To handle the inconvenience of lacking data we employ a panel data analysis as this approach increases the degrees of freedom in which variables can vary and thus, the power of the test. We obtain 118 observations.

Table 1 presents univariate descriptive statistics of our data. The statistics are based on monthly data on *TNA* (total net assets) for May 2010 – November 2010, number of funds for that same period and the means and standard deviations. In each of the months our sample includes a number of 17 pension funds with an average total net asset of € 436 millions and a standard deviation of € 39 million. This shows a wide spread in the *TNA* which becomes more evident after diving the sample into quintiles. The lowest quintile has an average *TNA* of € 1.7 million whereas the top quintile is formed of funds with an average *TNA* of € 345 millions. As the table shows, the size is skewed to the right with the fifth quintile containing funds with net assets representing more than 78% of the market. We also see a relatively steady growth in the TNA for the first three quintiles with a substantial difference for the fourth and fifth quintile. Consistent with prior literature (Chen et al., 2004, pp. 1276-1302, Bauer, 2010) we apply the logarithm operation so that the *LOGTNA* variable is the natural logarithm of the total net assets for each month.

Because performance is measured by net costs of the funds, the “rates of return” are obtained using net values. The *rates of return* publicized by *CSSPP* are growth rates of unit-value of funds. For determining these rates, the regulatory body takes the compounded annual growth rate of the unit value of the fund. We adjust the numbers from the CSSPP data base in order to obtain monthly average growth rates. Just for descriptive purposes we present the data in Euros. For accuracy, the values used in the study were in Romanian currency.

Table 1

Descriptive statistics

Time-series averages of (monthly) cross-sectional averages and standard deviations						
Pension fund size quintile						
Min		Mean	Median	4	Max	All funds
Number of funds	1	4	4	4	4	17
TNA	1.75	9.44	21.74	58.21	345.59	436.73
mil.Euro	[0.25]	[0.51]	[2.10]	[5.22]	[31.21]	[39.28]
LOGTNA	0.86	1.60	1.96	2.39	3.16	9.96
mil.Euro	[0.06]	[0.02]	[0.04]	[0.04]	[0.04]	[0.21]
FUNDGRT	0.0066	0.0109	0.0122	0.0135	0.0147	0.0579

This table reports summary statistics for the funds in the sample. "Number of funds" is the number of pension funds that meet our selection criteria of having “rate of return”. *TNA* is the total net assets of pension funds in million Euros. *LOGTNA* is the logarithm of *TNA*. *FUNDGRT* is the monthly growth rate of the fund’s unit value. The table presents the time-series averages of monthly cross-sectional averages and monthly cross-sectional standard deviations (shown in brackets) of fund characteristics.

3. Methodology

Our model specification is a basic one in which we look at how changes in a fund's performance are related to changes in its size. Consequently, we regress the "rate of return" of the funds by the lagged size of the funds measured as the log of total net assets under management. In their study Chen et al. (2004, pp. 1276-1302) regress market-adjusted returns (adjusted by CAPM, 3-factor model, 4-factor model) on lagged size and various fund characteristics like turnover, age, expense ratio, past-year fund inflows, and past-year returns in order to control for other characteristics than size driving the performance. Because the lack of data (for effective application of CAPM we need at least 60 months) and due to the frequency with which financial data is disclosed (i.e., sales, expenses are reported per semester) the only variables that are available on a monthly bases are the "rates of return" and the total net assets. For this reason we restrict the model to a simple regression.

$$FUNDGRT_{i,t} = \alpha_i + \beta_{i,t}\, LOGTNA_{i,t-1} + \varepsilon_{i,t}, \qquad (1)$$

where:

$FUNDGRT_{i,t}$ is the growth rate of unit-value of the pension fund i in month t, α_i is a constant for pension fund i, $LOGTNA_{i,t-1}$ is lagged pension fund size measured as logarithm of total net assets, and $\varepsilon_{i,t}$ is a generic error term that is uncorrelated with the independent variable.

Because the data imposed restrictions mentioned above we apply panel data analysis in order to obtain more observations and increase the power of the test. Fixed effects regression allows the intercept to vary cross-sectionally as it generates a dummy variable for each cross-section; the slope parameter is constant over time and space. The null hypothesis that is tested by using the fixed effects model is if the intercepts are the same for the entire sample (i.e. same average return for all pension funds) and rejecting it shows that growth rates vary cross-sectionally across funds.

Random effects model allows the intercepts for each cross-section to vary from a "base" intercept with a random variable (cross-sectional error term). One of the advantages of the random effects model it that it does not include dummy variable for each cross-section, leading to more degrees of freedom in which the variables can vary. Consequently, the estimation is more efficient. The disadvantage is that the cross-sectional error term is assumed not to be correlated with the regression error term and with all the explanatory variables. Moreover, the random effect model is preferred when the regression model does not omit variables that are not correlated with the explanatory variable included. When the regression model includes only one explanatory variable, bias coefficients can result from the fact that the estimator measures an increase of the dependant variable due to the explanatory variable when the case may be that the error term is causing much of the variation. As our model has as explanatory variable only the *LOGTNA* leaving out a series of unobserved omitted variables, we choose to estimate the regression coefficients using the fixed effects model. To statistically motivate our decision, we include in the results table the Hausman test statistics that measures if the random effects model would be just as good as the fixed effects one.

A disadvantage of the fixed effect method as noted by Chen et al. (2004, pp. 1276-1302) is that such an approach is subject to a regression-to-the-mean bias. They give the example of a fund with a year or two of lucky performance that experiences an increase in fund size. The issue is that, under the fixed effects, the performance regressed to the mean, leading to a spurious conclusion that an increase in fund size is associated with a decrease in fund returns. Nevertheless, giving the data issues mentioned above and relating to previous research that uses panel analysis because of data restrictions (Bauer, 2010) we further use the fixed effects model.

The strict regulations that *CSSPP* imposes on all pension funds, irrespective of being privately managed or optional, create an overall homogenous mass. Pension funds have limited possibilities in terms of investment choices. In most of the cases pension funds invest monies in government bonds, corporate equities, and deposits with an upper limit of 70%, 50% and 20% respectively. For this reason we do not make any correction for heterogeneity. As we have few months of data availability the survivorship bias is not an issue. Moreover, we do not take into account the survivorship bias because, as Blake (1993, pp. 371-403) points out, survivorship bias is less important for funds that invest mostly in bonds as bond fund performance is less variable and, consequently, fewer funds disappear in time.

Although we do not adjust for heterogeneity due to the investment strategies we make adjustment for the size of the pension funds. After sorting the data in size-quintiles for each month we see a significant spread in *TNA* variable which leads us to grouping funds in size-based-groups. This grouping results in two fund-size pension fund groups, one between € 4 and € 25 million and the other one between € 25 and € 345 million. By aggregating the funds we are trying to see if there is a negative association between size and performance and if there is one, which is the threshold for the negative association. Statistical test run over all five quintiles sustain the decision of grouping the first tree quintiles in one group and the last two in another group.

4. Results

Table 2 reports the estimation results for the regression specification in equation (1) where two situations are depicted, namely, for the two size-based groups. The estimation coefficients in front of *LOGTNA* are positive and statistically significant at a significance level of 1% for the funds with total net assets between € 4 and € 25 million, whereas there are negative and statistically significant coefficients for funds with total net assets between € 25 and 345 million. The Likelihood ratio and Hausman F-statistics are presented to validate the fixed effects model. The statistics indicate that the fixed effect model is the model that should be used for this specific analysis (instead of simple pooled estimation or random fixed effects). The R^2 measure shows how much of the performance percent of variation is explained by *LOGTNA*. Given the specifics of the Romanian pension market in which regulation limits the active management impulse of pension funds managers, the high R^2 is not unusual.

Table 2

Summary statistics

Total net assets (mil. euro)	4 - 25	25 - 345
α	-0.014***	0.028***
	[-2.55]	[5.92]
β	0.016***	-0.006***
	[4.43]	[-3.24]
Observations	62	56
Likelihood ratio	0.0000	0.0000
Hausman test	0.0011	0,0001
R2	87%	85%

This table shows summary statistics for the fixed effects model for the entire sample (17 pension funds for a period of seven months). t-ratios in parentheses; *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively. Also included are the number of observations, the F-statistics for the Likelihood ratio and Hausman test, and the R squared.

The regression results show that the fund's performance is inversely correlated to the assets under management for funds that have more than € 25 million under management. Although the performance (measured as growth rate of the value unit of the fund) of larger pension funds (above € 25 million) is mostly grater than the performance of the smaller funds (under € 25 million), the size affects negatively the performance of large funds. If we take the case of a large fund and assume an increase of at least € 1 million in the fund's net assets, that is 1% of the average of the forth quintile, the decrease in the performance of next month is of 0.6 BSP per month, respectively 14.4 BSP for two years. Conversely, an increase in size of 1% for the small funds, that is approximately € 0.2 million increase in assets, determines the performance of next month to go upwards with about 1.6 BSP per month, 38.4 BSP for two years respectively. To put the values into some perspective, the cross-sectional average growth rate for pension funds for 24 months (December 2008 – December 2010) is approximately 14%, whereas the inflation registered values of 13%. The gap of 1% between the "rate of return" of pension funds and the inflation rate can be "filled" by an increase of approximately € 119 million, causing pensions to barely cover the increase in prices. This scenario is not entirely improbable if we look at the growth rate of assets for the largest pension fund that registered an increase of € 90 millions lei in only 6 months. Therefore, any change in the performance measure translates in changes in the financial comfort of the future beneficiaries.

5. Conclusion

The empirical results are consistent with prior research (Chen 2004, pp. 1276-1302, Bauer, 2010) and show that there is a negative association between size, measured as total net assets, and performance. Specifically, the performance rises with size for funds under € 25 million in net assets and decreases with size for funds above € 25 million in net assets. Interestingly enough, this € 25 million in asset value is frequent for many privately managed pension funds (very few are under this value) whereas most of the optional pension funds have net assets under the threshold.

One explanation for size negatively affecting performance of pension funds is the level of transaction costs Chan et al. (2009, pp. 73-96). To prove this empirically, Chan et al. (2009, pp. 73-96) use an unique data base containing daily transaction information for "large" and "small" managers. The infancy of the Romanian pension market does not enable us to empirically study the argument brought on by Chan et al. (2009, pp. 73-96). We resume to mentioning the possible explanation and make suggestion for a more specialized data base for Romanian pension funds.

Pollet and Wilson (2008, pp. 2941-2969) introduce the phenomenon of *perfect scaling* under which *a manager of a $1 billion fund will select stocks in the same way as he or she would when managing only $10 million*. This *perfect scaling* leads to managers of large funds to *scale up* their existing investments disregarding the advantages of diversification. It appears that Romanian pension funds *scale perfectly* due to the tight regulations imposed by *CSSPP*. From the introduction of private pensions in Romania (year 2008 for private managed funds and 2007 for optional funds) until present time, few modifications were made to the structure of the portfolios of pension funds (to be seen as secure the funds have to be invested mostly in government bonds). As expected, pension funds with different sizes can be affected differently by little diversification of assets. Further analysis on the effects of size on performance of Romanian pension funds can seek the response in fund behavior (how the money is allocated amongst bonds, shares, deposits etc.) to size growth of the fund.

Overall, the paper has several contributions. Firstly, from out knowledge, this is the first paper that looks at effects of size on performance for the Romanian pension market. Secondly, we document a negative relation between size measured as total net assets and growth rate of fund's unit values after the threshold of € 25 million. This is useful information especially for participants that disregard their choice and accept the default option when it comes to selecting a pension fund. Moreover, Romanian pension funds exhibit similarities to funds from other markets allowing regulators to see the pros and cons without a fist-hand experience. This into-the-future perspective can lead to a reduction in decision mistakes in order to provide beneficiaries with the results they expect alongside the possibility of applying to the Romanian pension market analysis models that are validated on the already developed markets.

Notes

(1) According to Chen (2004, pp. 1276-1302), large funds have an average of $ 1,164.7 million in assets.

(2) For Clark (1988, pp. 16-33) large financial investors are those with more than $ 100 million in deposits.

(3) For Chan et al. (2009, pp. 73-96) large mutual funds are those with monthly market impact costs relative to funds under management exceeding AUD 200 millions.

(4) Pollet and Wilson (2008, pp. 2941-2969) regard large funds as those managing over 95% of the total market.

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