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Economies of Scale and Scope in French Mutual Funds

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This paper evaluates the economies of scale and scope in the French mutual funds (SICAV) industry. This segment of the financial sector offers the unique characteristic that some firms specialize, while others supply several products. The results suggest economies of scale and scope for small institutions and diseconomies for larger firms. An appropriate size for a diversified company is in the range of FF 2.9 billion. *Journal of Economic Literature* Classification Numbers: 310, 311, 314.

1. INTRODUCTION

This paper contributes to the literature on economies of scale and scope in the financial sector. Concerned mostly with depository institutions, previous US studies find little evidence of scale economies, except for banks with assets under $100 million. The evidence also fails to support a conclusion of global economies of scope.[1] This paper focuses on a different segment of the financial sector, the mutual funds industry. Since the latter relies heavily on information systems, one issue is whether investments in computers and software create fixed costs and the potential for

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[1] Gilbert (1984), Kolari and Zardkoohi (1987), and Clarke (1988) provide surveys. A recent study of the American securities industry (Goldberg *et al.*, 1991) reports simple conclusions.

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economies of scale or scope. This issue is investigated empirically with data from French mutual funds (SICAV).[2]

Both the characteristics of the data and the methodology differ from those usually found in the banking literature. Most empirical studies of banking technology involve samples of banks that offer a wide variety of services, and little information about economies of scope is obtained. Our data on French mutual funds are well suited to evaluate economies of scope because they contain both specialized and diversified institutions.

Concerning the methodology, several authors have demonstrated the limitations of the translog cost function. Berger *et al.* (1987) emphasize that the translog is not defined at zero output points, so the conclusions depend on the proximity of the zero output approximation. Röller (1990a) argues that the translog is not a robust functional form because of its flip-flop property. As one or more outputs approach zero, i.e., as production processes are modeled along the axis in output space, the estimated cost surface will either be zero or infinite depending on the sign of the second-order parameter estimates.[3] In other words, a change in the sign of these parameters can flip the surface around, leading to a fundamentally different cost structure—globally as well as locally—and different policy conclusions. A quadratic cost function is used here to avoid these methodological problems.

The paper is organized as follows. Section 2 provides a description of the data. The model is developed in Section 3, and the empirical results follow in Section 4. Section 5 addresses market power, and Section 6 concludes.

2. SICAVS IN FRANCE

The multiproduct firm herein is an institution that offers several types of SICAVs. The 1987 sample includes 137 institutions offering 604 SICAVs. Data on these institutions are presented in Table I. Institutions range in size from FF 100 million to FF 152.5 billion. As the last quintile indicates, there are a number of very large institutions. The five largest control 56% of the market.

Twelve categories of SICAV are recognized in France. To limit the

[2] A SICAV, Société d'Investissement à Capital Variable, is an open-end mutual fund. This paper is among the first to study economies of scale and scope in the mutual funds industry. Ferris and Chance (1987) provide evidence on the American mutual funds industry, but do not test for economies of scope, nor do they use any of the flexible functional forms, such as the translog.

[3] In addition, these second-order effects are often insignificant. See, for example, Evans and Heckman (1984) and Charnes *et al.* (1988).

TABLE I
SIZE OF THE 137 INSTITUTIONS OFFERING SICAVs IN FRANCE
(FF MILLION)

Quintiles	Mean	Minimum	Maximum
1	178	100	300
2	515	300	800
3	1,267	900	1,800
4	2,804	1800	4,100
5	25,266	4600	152,500

Note. The five largest institutions control 56% of the market: Crédit Agricole (17.7%), Banque Nationale de Paris (11.48%), Caisse des Dépôts et Consignations (11.1%), Crédit Lyonnais (9.2%), and Société Générale (7%). Source: TGF, Paris, December 1987.

number of parameter estimates, we have grouped them into five categories: Money market funds (MMF), French bonds (FRB), French equities (FRE), real estate (REE), and international (INT).[4] Wherever several SICAVs of the same category are offered by one institution, they are merged into one. After merging, we have 137 institutions offering 298 SICAVs. Data on the number of SICAVs, their size, and the level of operating expenses are given in Table II.

Operating expenses, which are not publicly regulated, include the cost of promotion, auditing and legal fees, and the management fee.[5] The money market funds dominate the industry, ranging in size from FF 200 millions to FF 80.5 billion.

Many institutions specialize, offering a limited variety of SICAVs. Almost half the sample, 60 institutions, offer only one category of SICAV. Twelve institutions offer all categories. The large number of "zero" points in the sample is particularly welcome in a study of economies of scope.

3. THE MODEL

Each institution is assumed to be a multiproduct firm that can sell up to five kinds of SICAVs. Output is defined as the total assets of each type. The total cost variable is the reported operating expenses, which includes

[4] A detailed description of the French mutual funds industry and the grouping is available in Dermine and Röller (1990). In contrast with the US mutual fund industry, one cannot distinguish special purpose equity funds (such as income-orientated, growth, or maximum capital gain).

[5] Separate data on the management fees are not available. The definition of operating expenses is similar to that used by Ferris and Chance (1987).

TABLE II
THE 1987 SICAV MARKET IN FRANCE

Market	Number of SICAVs	Market size (FF billion)	Size of SICAVs (FF million) Mean	Min.	Max.	Operating expenses per SICAV (percentage of assets) Mean	Min.	Max.
Money market Funds	89	433.7	4873	200	80,500	0.50	0.05	1.00
French bonds	93	216.7	2330	100	39,700	0.70	0.10	1.20
French equities	41	117.2	2858	100	26,500	0.82	0.20	1.20
Real estate	15	12.0	800	100	5,600	0.70	0.40	1.05
International	60	80.7	1362	100	6,900	0.76	0.02	1.50

Note. Source: TGF, Paris, December 1987.

the management fee. In fact, however, this cost variable includes a profit margin. This raises a problem of market power. That is, the total cost variable may not distinguish between variations in total costs across firms and higher fees due to market power.[6] A model that separates the scale from the market power effect is estimated in Section 5.

The 1987 sample includes a cross section of 137 institutions located in Paris, having access to the same technology, and facing similar factor prices. The cost function is defined as the usual problem of minimizing costs subject to factor prices, using the second-order approximation

$$C^* \, (q^*) = \alpha_0 + \sum_{i=1}^{n} \alpha_i q_i^* + \sum_{i=1}^{n} \sum_{j=1}^{n} \alpha_{ij} q_i^* q_j^* , \qquad (1)$$

where $q^* =$ (MMF, FRB, FRE, REE, INT) is the output vector of five mutual funds and $C^*(q^*)$ is total costs. Note that input prices and an index of technology are assumed to be embedded in the constant term. Thus homogeneity, concavity, and nonnegativity cannot be explicitly imposed. Also, factor demand equations via Shepard's Lemma cannot be used in the estimation.

We estimate the above model (1) using two functional forms. First, the well-known translog (TL) cost function is given by $C^*(q^*) = \ln C(\ln(q))$. As discussed above, the translog specification is not well suited to evaluate economies of scope. We therefore follow the approach of Röller (1990b) and estimate a quadratic (Q) cost function defined by setting $C^*(q^*) = C(q)$.

[6] Goldberg *et al.* (1991) face a similar problem. Taking revenues as a measure of output in the securities industry, they assume that there is no systematic relationship between prices and the size or product mix of firms.

TABLE III
PARAMETER ESTIMATES OF THE TRANSLOG AND QUADRATIC COST FUNCTIONS

	Translog[a]		Quadratic[b]		Quadratic with market power[c]	
Explanatory variable[d]	Parameter estimate	t stat.	Parameter estimate	t stat.	Parameter estimate	t stat.
Constant	−0.482	−1.27	1.146	1.89	1.189	1.99
MMF	−0.100	−0.13	0.004	8.13	0.005	8.48
FRB	0.002	0.02	0.002	1.93	0.002	1.99
FRE	0.147	2.59	0.011	6.63	0.009	2.61
REE	0.208	0.92	0.014	2.07	0.015	2.26
INT	0.003	0.03	0.010	7.93	0.010	7.91
MMF × MMF	0.051	5.47	−1.47E-7	−1.73	−2.253-7	−1.69
MMF × FRB	−0.017	−3.79	2.91E-7	0.79	2.91E-7	0.84
MMF × FRE	−0.008	−1.69	1.37E-7	0.20	1.40E-7	0.21
MMF × REE	0.026	0.68	1.55E-6	5.61	1.40E-5	3.65
MMF × INT	−0.001	−2.47	6.68E-7	2.65	5.34E-7	1.75
FRB × FRB	0.032	4.08	2.76E-7	1.87	2.31E-7	1.31
FRB × FRE	−0.002	−0.42	4.51E-7	1.01	3.06E-8	0.04
FRB × REE	−0.026	−0.56	5.30E-7	0.70	4.85E-6	0.68
FRB × INT	−0.016	−3.11	2.30E-7	2.18	2.21E-6	1.96
FRE × FRE	6.7E-6	0.01	−1.82E-7	−2.35	−1.45E-6	−1.37
FRE × REE	0.011	0.41	−4.44E-6	−2.83	−4.07E-6	−2.51
FRE × INT	−0.005	−1.13	−3.50E-7	−1.69	−2.58E-6	1.19
REE × REE	0.007	0.37	−1.90E-7	−0.20	−3.91E-6	−0.40
REE × INT	−0.045	−0.83	−3.70E-6	−9.13	−3.27E-5	−5.74
INT × INT	0.026	2.84	−1.70E-7	−6.41	−1.63E-6	−6.26
Market Power					5.07	0.45
R^2	0.898		0.998		0.998	

[a] Equation (1) with $C^*(q^*) = \ln C(\ln(q))$.
[b] Equation (1) with $C^*(q^*) = C(q)$.
[c] Equation (2).
[d] Money market funds (MMF), French bonds (FRB), French equities (FRE), real estate (REE), and international (INT).

4. EMPIRICAL RESULTS

The parameter estimates for the translog and quadratic cost functions are reported in Table III. Both specifications have statistically significant second-order terms, justifying the use of these flexible forms. Moreover, the t statistics of parameter estimates and the R^2 are somewhat higher for the quadratic form.

Ray scale economies (RSCE) measure cost behavior when all outputs are expanded by the same proportion; that is, scale economies exist if and

TABLE IV
RAY SCALE ECONOMIES (RSCE)

Institution size[a] (FF million)	Translog	Quadratic	Quadratic with market power
100 < assets < 1300	0.703***	0.695***	0.699***
	(18.35)[b]	(4.93)	(47.68)
1300 < assets < 2900	0.858*	0.893*	0.880**
	(3.30)	(2.87)	(4.10)
2900 < assets < 5200	0.818	1.047***	1.020
	(0.81)	(7.35)	(0.21)
Assets > 5200[c]	0.880	1.118**	0.935
	(0.28)	(4.47)	(0.48)
Five largest[d]	0.962	1.705*	0.943
	(0.01)	(3.38)	(0.14)

[a] RSCE are evaluated at the mean of each of the five groups.
[b] t statistic in parentheses.
[c] The five largest institutions are excluded.
[d] Five largest institutions offering the five Sicavs.
* Significantly different from one at the 10% level.
** Significantly different from one at the 5% level.
*** Significantly different from one at the 1% level.

only if the sum of the cost output elasticities is smaller than one. The RSCE are given by

$$\mathrm{RSCE} = \sum_{i=1}^{n} \frac{\partial \ln C}{\partial \ln (q_i)}.$$

Table IV reports the RSCE estimates for the two functional forms evaluated at five size categories.

Increasing and significant RSCE for the first two size categories are reported for the TL cost function, 0.70 and 0.86, respectively. The hypothesis that constant RSCE exists cannot be rejected for the three larger size classes. The Q cost function yields very similar results regarding the smaller size institutions. RSCE are increasing and significant at 0.69 and 0.89 for the two smaller size categories, respectively. As the institution grows, however, the Q form yields significant diseconomies of scale. The discrepancy between the TL and Q cost functions for some ranges in output is hardly surprising. The fact that the TL may overestimate returns to scale has been noted in Guilkey and Lovell (1980). Nevertheless, economies of scale in the French mutual funds industry appear to exist up to approximately FF 2.9 billion in total assets, whereas constant or possibly declining returns to scale seem to prevail for larger firms.[7]

Overall economies of scope (OEOS) exist if single output production is more costly than multioutput production. The degree of OEOS is given by

$$\frac{\sum_{i=1}^{n} C(q_i, 0) - C(q)}{C(q)}.$$

The degree of OEOS is the percentage increase in total costs from specialized production. As discussed above, OEOS will be evaluated for the Q cost function only.[8] The results are reported in Table V.

As in the case of economies of scale, most of the overall economies of scope exist for smaller firms. In particular, in the total asset range up to FF 1.3 billion, costs would more than double by breaking the firm into its five components. This cost saving is reduced in firms with assets up to FF 2.9 billion (the saving is 46%), but it is still statistically significant. For medium-size firms the cost savings from combined administration of mutual funds is statistically insignificant, and for very large firms (assets of FF 5.2 billion and above) substantial and significant diseconomies of scope are evidenced (costs increase up to 106% for the very largest firms). The presence of large firms operating under diseconomies of scope suggests that this young industry has not yet reached a mature competitive equilibrium.

One may wonder whether these economies for smaller firms are due to strong economies between just one or two of the five mutual funds, or whether all mutual funds exhibit some form of cost complementarity. If the former is the case, one would expect that competitive pressures would force some firms to specialize in one subgroup of mutual funds and others firms in a different subgroup. If the latter, small firms may need to offer all mutual funds to be competitive. To investigate this issue further, we analyze product-specific economies of scope (PSEOS), defined for two subgroups of the n-dimensional output vector q, say $q_a = (q_1, \ldots, q_p)$

[7] A related concept is product-specific economies of scale (PSEOS), which measures scale properties when only *one* output changes. We find PSEOS very close to unity for all SICAVs indicating no individual scale effects. This suggests that the RSCE results above, which measure cost behavior when *all* outputs change, are indicative of joint production effects [see Baumol *et al.* (1982), p. 70). Our empirical evidence on economies of scope confirms this intuition. The PSEOS results are available from the authors upon request.

[8] When the TL form is used to evaluate OEOS, we obtain degenerate results, as expected. For instance, the cost of medium-size institutions would be more than 100 times higher if they specialized. We use FF 200,000 to approximate the zero output in the translog specification.

TABLE V
ECONOMIES OF SCALE AND SCOPE—QUADRATIC COST FUNCTION

		Product-specific economies of scope[c]			
Institution size (FF million)[a]	Overall economies of scope[b]	(MMF) − (FRB,FRE, REE,INT)	(MMF,FRB) − (FRE,REE,INT)	(MMF,FRB FRE) − (REE,INT)	(MMF,FRB, FRE,REE) − (INT)
100 < assets < 1300	1.25*	0.30*	0.29*	0.29*	0.31*
	(3.52)[d]	(3.23)	(3.05)	(3.24)	(3.54)
1300 < assets < 2900	0.46*	0.078	0.084	0.086	0.104
	(2.89)	(1.28)	(1.42)	(1.63)	(2.36)
2900 < assets < 5200	0.028	−0.055	−0.13**	−0.11**	0.045*
	(0.11)	(1.91)	(4.70)	(5.61)	(3.25)
Assets > 5200[e]	−0.367**	−0.391***	−0.632*	−0.282	−0.50***
	(4.40)	(8.43)	(3.42)	(2.33)	(46.36)
Five largest[f]	−1.06***	−1.12***	−1.25**	−0.96***	−0.73**
	(6.30)	(14.81)	(4.73)	(46.9)	(8.3)

[a] Economies of scope are evaluated at the mean of each of the five groups.
[b] Percentage increase in total cost from specialized production.
[c] Percentage increase in total costs from having two firms producing a vector (q_a) and a vector (q_b).
[d] t statistic.
[e] The five largest institutions are excluded.
[f] Five largest institutions offering the five Sicavs.
* Significantly different from zero at the 10% level.
** Significantly different from zero at the 5% level.
*** Significantly different from zero at the 1% level.

and $q_b = (q_{p+1}, \ldots, q_n)$. The degree of PSEOS with respect to q_a and q_b is given by

$$\frac{C(q_a, 0) + C(0, q_b) - C(q_a, q_b)}{C(q_a, q_b)}.$$

Table V reports the degree of PSEOS for various subgroups. Clearly, significant economies of scope exist for smaller firms and diseconomies for larger firms, independently of the subgroup breakdown. This indicates that economies of scope exist between all funds for smaller firms.

Thus, both economies of scale and scope seem to exist for smaller firms and disappear for larger firms. Furthermore, the economies of scope seem to be present across all products. Thus, it is a medium size and diversity that would appear to enhance prospects in an increasingly competitive environment.

As discussed above, measured total cost includes a management fee and possibly a profit margin. This raises a problem of relative market power. That is, larger firms might be biased toward displaying diseconomies of scale if market power allows them to charge a higher management fee. This issue is addressed in the next section.

5. MARKET POWER

Two approaches are adopted to test the market power hypothesis. In the first, the cost equation is modified to incorporate a market power variable. In the second approach, the largest institutions are eliminated from the sample. Consider first the equation

$$F = e^{\delta \cdot \mathrm{MS}_i} \cdot C^* (q^*), \tag{2}$$

where F denotes total operating expenses including the management fee, MS_i is the market share of firm i in the total mutual fund market, and C^* denotes operating expenses net of the management fee. The parameter δ will test whether market power allows larger institutions to achieve higher price-cost margins. Note that the above specification assumes that market share increases profit exponentially.

Table III reports the estimates of Eq. (2) for the Q cost function specification. These estimates indicate that the market power variable δ is not significant, suggesting that market power is unimportant. Furthermore, the RSCE estimates reported in Table IV indicate that scale economies are, if anything, even smaller now. In particular, significant scale economies are in evidence only for the smallest institutions. All others exhibit constant returns to scale.[9] A limitation of this approach is that market share and size are obviously correlated, so the two effects might be statistically inseparable. Nevertheless, the economies of scale and scope observed for small and medium-size firms would be reinforced further if a profit margin–market share linkage did exist.

An alternative approach to disentangling the market power from scale effects is to eliminate the largest institutions from the analysis. In our sample, in particular, the largest five institutions hold 56% of the total

[9] The economies of scope results obtained with this specification are similar to those reported in Table V for the first two categories, but no diseconomies are observed for the last three categories. Using a TL cost function specification augmented by a log of market share and a squared log of market share terms yields results similar to those reported in Table IV.

market. However, none of the results reported above are affected by the elimination of the five largest firms.[10]

The absence of relative market power may reflect the distribution system in France. SICAVs are distributed mostly through the banks. Branches have an incentive to promote the SICAVs managed by their own banks. Thus, local monopoly power could exist at the level of branches. This market power would be identical for the branches of small and large banks.

6. CONCLUSIONS

This paper has examined economies of scale and scope in the French mutual funds industry. The focus on a specific sector of the financial services industry is motivated by two reasons. First, the sample of firms includes small, large, specialized, and diversified institutions. It is therefore well suited to the study of economies of scale and scope. Second, the mutual fund industry uses information technology intensively, raising the possibility of fixed costs and economies of scale. It appears that both economies of scale and scope exist for smaller firms and disappear for larger firms. Furthermore, economies of scope exist across all products. This would indicate that in the French mutual funds industry it is both medium size and diversity that enhance survival prospects in an increasingly competitive environment. These results accord with Berger *et al.* (1987) for the U.S. banking industry. Moreover, our results are robust to alternative specifications. Dropping the five largest institutions or adding a markup variable results in very similar conclusions.

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[10] These results are available from the authors upon request.

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