Economies of Scale for Real Estate Investment Trusts

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To better understand the way that an industry operates, economists test for efficiencies of production. Economies of scale exist for a firm within an industry when larger quantities of the firm's output are produced at a lower average cost than are smaller quantities of output. For securitized real estate, such as Real Estate Investment Trusts (REITs), the outputs are the capitalization of the assets and the dividends paid out to shareholders. Scale economies exist when REITs that have larger asset bases or that pay out larger dividends show lower average costs than REITs with smaller asset bases or smaller total dividends.

There are many sources of cost efficiencies that can result in economies of scale. For example, a REIT can achieve internal scale economies by focusing on a single property type or by concentrating assets geographically. Also, larger REITs may achieve a level of market power that results in external cost economies, perhaps in financing or management contracts, that are unavailable to less capitalized REITs.

Cost efficiencies are affected by many influences, including diversification differences between REITs, use of debt financing and the type of management. These influences must be controlled in the analysis of scale economies. For example, diversification affects REIT expenses. Diversification by investment type (mortgages or equity), property type or geographic location is a primary risk reduction strategy for REITs.   Because diversification alters the cost structure of the REIT, it is important to test for operational efficiency of REITs in light of these imposed costs.

The most common measure of operating efficiency in economies of scale studies is the elasticity of cost with respect to output. When the rate of increase in output exceeds the rate of increase in cost, scale economies characterize the industry. Thus, as firms grow, average unit costs decline. Economies of scale are evident when larger firms are more cost efficient than smaller firms. Traditional economic theory assumes that a firm will increase its size as long as marginal revenues exceed marginal costs or decrease its size as long as marginal costs exceed marginal revenues.

In financial economics, the translog cost (TLC) model is the most pervasive approach to the analysis of economies of scale. The TLC model offers the advantages of simplicity of interpretation and familiarity due to its common use. The cost elasticity of an output is found by taking the partial derivative of the TLC model with respect to that output. For an individual REIT, using a multiple output TLC model, the overall scale economy estimator (SCE_O) is the reciprocal of the sum of estimated cost elasticities of the individual outputs. For any REIT, if the overall scale economy estimator exceeds one, scale economies exist. If the scale economy estimator is less than one, scale diseconomies exist; that is, the marginal cost associated with an additional dollar of output exceeds one dollar. Finally, a result equal to one signifies constant average cost.

Data were collected for the years 1992, 1993 and 1994. The original sample is composed of all REITs listed in the National Association of Real Estate Investment Trust (NAREIT) Handbook for each

given year. Many observations were incomplete and thus eliminated from the sample. The final sample includes 85 observations from 1992, 118 from 1993, and 146 from 1994. Cost data are from <u>Moody's Bank & Finance Manual</u>.

The TLC model is estimated separately for the years 1992, 1993, and 1994. For each year, the dependent variable is the natural logarithm of the total costs for each REIT. The two outputs are the total dividends for a REIT and the average total assets for the REIT. A set of variables are included in the model to control for factors that affect the total costs of a REIT. The debt ratio, defined as total liabilities divided by total assets, accounts for differences in financing between REITs. Other variables account for the percentage of the REIT=s assets invested in mortgages, and whether the REIT is internally managed or managed by a REIT affiliate. To account for property type diversification differences across REITs, the Hirschman-Herfindahl index is included. Finally, to account for geographic differences, the state in which the REIT has the largest market exposure was identified. Four binary variables are created to reflect investment concentration in either California, Florida, Texas or New England.

Results are generated for multiple specifications of the TLC model. Also, for comparison purposes, a single-output TLC model, based on total assets, is estimated. For each firm, the overall scale economy estimate for each firm is calculated. From these estimates, the average scale economy estimator ($\overline{SCE}$) is calculated. The results show there is sufficient statistical evidence to conclude that, using the translog cost function, REITs exhibit economies of scale.

While the data unambiguously supports the existence of economies of scale for REITs, the estimated magnitude of the cost efficiencies is difficult to ascertain because of variability in the estimates. However, several conclusions are evident:

1) In all cases, the results suggest that economies of scale exist for the REIT industry. Whereas the industry on average evidences scale economies, differences in leverage, management type and the degree of investment in mortgages clearly affect the level of scale economy realized by individual REITs.

2) When the translog cost model includes variables that control for factors that affect costs, the estimated scale economies generally increase.

3) When additional variables are included in the translog cost model to account for differences in property type diversification or geographic influences, there is little additional impact on the measured scale economies. These results suggest that the impact of diversification on the estimated scale economies is inconsistent.

4) The results for the less complex, single output (total assets) cost model are similar to those of the two-output translog cost model. This similarity implies that the Atotal asset≅ effect is the dominant determinant of the overall scale economy measure in the two output model. The practical aspect of this result is that a scale economy measure based on a single output, that being total assets, is as effective as the one based on the more complex two-output model.

5) Economies of scale for REITs vary considerably over time, implying that the cost function itself is unstable over time. Much of this instability is likely due to the nature of the data. Self-

reported data often suffers from inconsistency in the reporting of various quantities. Nevertheless, estimated scale economies are largest for the 1993 sample of REITs. Also, estimated economies of scale disappear for larger REITs in 1992 and 1994. The results seem to show, on the basis that scale economies disappear, that there is an optimal size for REIT cost efficiency. However, this optimal size is not stable because it depends on the characteristics of the individual REIT and varies over time.

This study investigated economies of scale in REITs. The question of the existence of economies of scale, i.e. whether REITs can benefit from being larger, is important to REIT managers, analysts and investors. Improving the efficiency of operations is one way to improve the performance of REITs. The results show that economies of scale exist for all REITs sampled that are smaller than the average REIT size for the specific sample. The results also show the existence of an optimal size for REITs, but the optimal size cannot be isolated because it depends on the characteristics of the individual REIT and varies over time. The implication of diseconomies of scale is that over-sized REITs can become more efficient by downsizing. This, of course, can be accomplished by spinning off assets or by segmenting the assets of over-sized REITs into efficient subgroups.