Archives of Business Research – Vol.5, No.12
Publication Date: Dec. 25, 2017
DOI: 10.14738/abr.512.3988.
Koolma, R., Hulst, R., & Montfort, A. (2017). Are larger organizations more efficient and strategically stronger? A cross-sectional and longitudinal research into Dutch housing corporations. *Archives of Business Research, 5(12),* 126-147.

Are larger organizations more efficient and strategically stronger? A cross-sectional and longitudinal research into Dutch housing corporations

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ABSTRACT

There is only limited research on the relation between the scale of operation of organizations and their efficiency. Moreover, the research methods used are coarse. The relation between scale of operation and strategic position has not been subject of systematic research at all. In this article, a sophisticated, theory-based method is developed to assess the relation between the scale of operation of organizations and their efficiency and strategic position. The method is applied to the sector of housing corporations in the Netherlands. Although the optimal scale of operation appears to be larger for efficiency than for strategic position, housing corporations have grown far beyond both optimal scales.

Keywords: scale, economy of scope, strategic position, resource dependency, non-profit organizations

INTRODUCTION

About two decades ago, as a part of the quest for a more efficient delivery of public services, Dutch non-profit organizations in sectors such as education, health care, and welfare services started to merge extensively. These non-profit organizations deliver public goods and services and are wholly or partially funded by the state. Dutch government officials and managers considered the upscaling of activities as a means to improve their *efficiency* and *strategic position*. It was expected to have a positive impact on the ratio between the production volume and the resources used for production, and to strengthen the position of the organisation *vis-à-vis* government bodies, private firms, and other non-profit organisations (Koolma & Van Montfort, 2016).

As far as the *efficiency* of an organisation is concerned, the optimistic views of policy-makers and managers on the benefits of up-scaling largely reflect classic theories in the field of business administration (cf. Trautwein, 1990). The main argument states that large organizations have access to indivisible equipment not available for small organizations; that large-scale production makes task specialization possible; and that a large organization enables diversification. Thus, upscaling would result in economies of scale and scope (Mansfield, 1976; Dollery & Fleming, 2006). Classic theories do, however, also include the notion of diseconomies of scale and scope. Large organizations that have surpassed a certain

scale of operation may show higher marginal production costs because of the complexity of coordination and management (Allan, 2003; Dollery & Fleming, 2006). Up to now, research has failed to provide a reliable insight into the optimal scales of production and diversification. Current research into economies of scale and scope is characterized by the arbitrary use of output indicators or the neglect of intermediate and moderating variables (Boyne, 1992; Byrnes & Dollery, 2002; King et al., 2004).

As far as the *strategic position* is concerned, the optimistic views of policy-makers and managers on the positive relation between the scale of operation of an organization and its strategic position reflect theoretical approaches that focus on the industrial environment of a firm. Big firms are supposed to have more bargaining power towards suppliers and buyers and to have more resources at their disposal to fight competitors or to prevent new firms from entering the industry. They would also be less dependent on other organizations for safeguarding resources that are important for their survival (Porter, Competitive Advantage, 1985). Whether a better access to resources is actually used for long-term survival is another matter.

Given the limitations and shortcomings of current research, our aim was to develop a sophisticated theory-based method for studying scale effects and to assess the usability of this method in a particular sector. The method should take three different issues into account: economies of scale, economies of scope and the relation between scale and strategic position. Moreover, the method should avoid the methodological limitations of current research, using analytical models that include appropriate moderating, intermediate, and output variables. To this end, three theoretical models were developed, which are presented in the next section.

To assess the usability of the method, we conducted research in the sector of housing corporations in the Netherlands. Dutch housing corporations are privately established non-profit organizations entrusted with the public task to provide good quality housing accessible for lower income groups. Over the past decades, housing corporations have been involved in a steady process of merging. As a result, their number has decreased from 855 in 1985 (CFV, 2012) to 376 ultimo 2012. In this period, the average number of housing units per corporation rose from 2.290 to 6.144. The biggest corporation owns more than 77.920 units.

The general question of our research question was how the scale of operation of a housing corporation is related to its efficiency and strategic position.

THEORETICAL FRAMEWORK AND SPECIFIC RESEARCH QUESTIONS

A larger scale of operation may lead to higher *efficiency* through economies of scale and economies of scope*. Economies of scale* mean that an increase in the quantity of produced goods or services results in lower average production costs per good or service. *Economies of scope* mean that the production of two or more different goods or services by one organization entails lower costs than the production of each of these goods or services by separate organizations (Dollery & Fleming, 2006; Bel, 2012).

Economies of scale

Returns to scale are the result of two opposing forces. On the one hand, a large scale of operation may have several advantages. It implies that fixed production costs, for example the costs that stem from the use of machinery or a plant, can be spread across a large number of goods or services. Exploiting capital goods to their maximum results in low fixed production costs per unit of output. Another advantage of a large scale of operation is that it facilitates the specialization of labour (and possible other inputs) and thus increases productivity. A last

advantage concerns the discounts that can be achieved on bulk-purchasing of inputs, resulting in low variable costs per unit of output (Given, 1996; Dollery & Fleming, 2006).

On the other hand, there are also possible disadvantages. Higher production volumes imply an increase in managerial efforts, for instance in the field of inventory control and human resources management. At high production levels, the increase in managerial efforts can exceed the benefits of the increase in production volume and thus contribute to higher variable production costs per unit of output (Boyne, 1992; Allan, 2003; Dollery & Fleming, 2006).

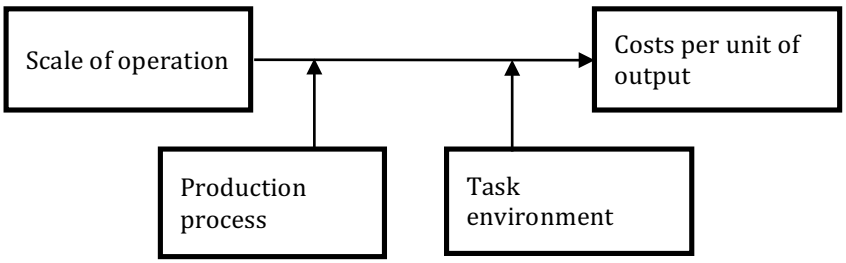
It is, however, unclear whether there is one or a number of levels of production that display maximum efficiency and, if so, at which level of production diseconomies occur. How the opposing forces affect the returns of scale depends on characteristics of the production process and on environmental circumstances (Boyne, 1992; Allan, 2003).

With respect to characteristics of the production process, the distinction between labour-intensive and capital-intensive goods or services is relevant. In the case of labour-intensive goods or services, a bigger volume of output generally requires a directly related larger number of employees. Efficiency gains from spreading the costs of capital goods will be relatively small. In contrast, when production volumes increase, the costs of managerial efforts can rise sharply. This could mean that an organization that produces labour-intensive goods, reaches its maximum efficiency at relatively small volumes of production. For capital-intensive production processes, on the other hand, one would expect maximum efficiency to occur at relatively large production volumes (Dollery & Fleming, 2006).

In the same vein, the environment can affect the returns on scale. Consider, for instance, the density of customers in the working area of an organization. If there are many customers in the area which is serviced by the organization, transport can be organized efficiently; and if an increase in sales can be realized serving more customers in the same area, transport costs per unit of output could even be reduced. In contrast, if customer density is low and an increase in sales can only be realized by geographical extension of the service area, transport costs will be relatively high, and marginal transport costs will tend to rise (Bel, 2012). All other conditions being equal, in high customer density areas, maximum efficiency can be realized at smaller production volumes than in low customer density areas.

The foregoing theoretical insights provide us with a conceptual model to represent the relation between the scale of operation of an organization and the costs per unit of output of an organization.

Figure 1 Relation between scale of operation and costs per unit of output, moderated by production process and task environment



In our analysis of the performance of Dutch housing corporations, we assume that characteristics of the production process are more or less the same for all corporations, as

housing corporations are active in the same sector and engaged in the same type of service delivery. So, in the analyses to perform, the production process will be treated as a constant. The analyses will answer the following specific research questions: What are relevant units of output and what varying characteristics of the task environment have to be taken into account? How does the scale of operation relate to the average costs per unit of output, controlling for relevant characteristics of the task environment?

Economies of scope

There is a large body of literature that suggests a positive relation between the size of an organization and diversification. Large organizations tend to offer a bigger range of products or services than small ones (Gort, 1962; Amey, 1964; Utton, 1977; Lichtenberg, 1992; Aw & Batra, 1998). One of the economic rationales for diversification put forward is that it creates economies of scope: the joint production of two or more different goods or services by one organization can result in cost savings compared to a situation in which each good or service is produced by a separate organization (Teece, 1980; Panzer & Willig, 1981; Dollery & Fleming, 2006).

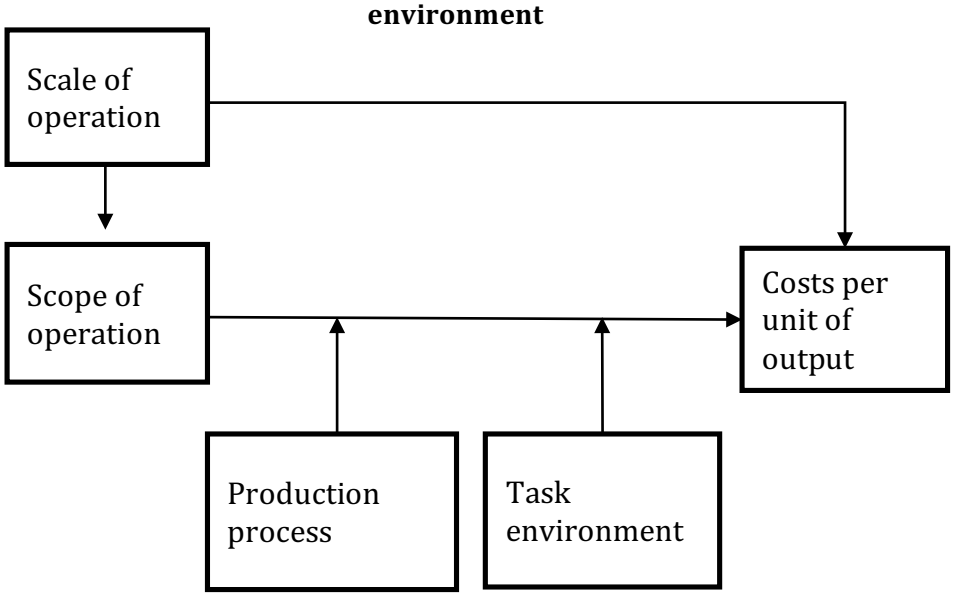
The main source of economies of scope suggested in literature is the shared use of inputs in the production of different outputs. If the shared production factor is imperfectly divisible, redundant capacity in one production process can be used in another (Willig 1979). Know-how represents a special type of input which, once acquired for one production process, can be applied for free in another production process (Penrose 1959; Teece 1980). Scope economies can also result from by-products of a production process and from situations where the output of one process can serve as an input for another production process (Dollery & Fleming, 2006).

If the technical conditions for synergy are fulfilled, economies of scope will occur when the governance costs of diversification are smaller than the costs of market transactions involving capital goods, raw materials, information, and know-how (Teece, 1980). This also explains why in multiproduct organizations, economies of scope sometimes do not materialize. It is up to the management of an organization to exploit the possibilities for synergy, to make sure that redundant capacity is actually used and that multi-applicable know-how is actually exploited to the max.

In large complex organizations, this can be a hard job, especially when product divisions enjoy a certain degree of autonomy. Management then faces increasing monitoring costs and has to deal with division heads that seek preferential treatment from the corporate centre (Rawley & Simcoe, 2010). Therefore, management and decision-making costs can rise to a level where they exceed the costs of market transactions, while at the same time the organization is not flexible enough to close down production lines or outsource the production of know-how (Dass, 2000).

For the analyses of the relation between the scope of an organization and the production costs per unit of output, it is necessary to take the characteristics of the production process and relevant elements of the task environment into account, for the same reasons as for the analyses of scale efficiencies. Moreover, it is clear that the average costs of a multiproduct organizations are the result of both scale effects and scope effects.

Figure 2 Relation between scale of operation and costs per unit of output, mediated by scope of operation; the relation between scope and costs moderated by production process and task environment



Assuming that characteristics of the production process do not vary per corporation, in our analyses of the performance of Dutch housing corporations in terms of efficiency, we will address the following specific research questions about possible scope effects: How does the scale of operation relate to the scope of operation? What are relevant units of output and relevant characteristics of the task environment? How does the scope of operation relate to the average costs per unit of output, if we control for the scale of operation and for relevant characteristics of the task environment?

Strategic position

In order to survive, an organization must adapt to significant changes in its environment. To a considerable extent, the adaptation to environmental changes takes place through the renewal of the organization's portfolio of products and services. Adaptation through portfolio renewal requires a strong strategic position (Sparrow & Ringland, 2010; Ben-Menahem et al., 2013).

According to resource dependency theory, the strategic position of an organization is determined by the degree in which the organization has access to resources that are essential for its business success and survival. An organization has a stronger strategic position to the extent that it is less dependent on other organizations for acquiring relevant resources (Hilmann et al., 2009; Davis & Cobb, 2010). Of course, the relevant resources of an organization vary depending on the production process, but roughly consist of three categories, namely labor, capital, and land, whereby land can be considered as a specific kind of capital (Foley, 2003).

It can be assumed that organizations that operate on a large scale are less resource dependent on other organizations than small-scale organizations. First, large-scale organizations are more able to develop and produce relevant resources themselves. One can think of the development of computerized administrative systems or specialized work tools and the production of useful intermediates. Because of the substantial knowledge and skills that are present internally, there is less need to obtain such resources from other organizations (Lankford & Parsa, 1999).

Second, large-scale organizations have better possibilities to influence the decision-making of legislative authorities and advisory boards. Due to their larger prestige, bigger power, and higher societal importance, the interests of large-scale organizations are taken more into account in the considerations of public decision-making bodies, which leads to more favourable policies, rules, and arrangements for such organizations (Berger, Hertog & Park, 2016).

Third, large-scale organizations are more effective in negotiations with resource providers. They can offer counterparts more compensation in exchange for resources and have a larger number of employees who are specialized in successful bargaining (Mintzberg, 1983; Chae & Heidhues, 2004).

Fourth, large-scale organizations are assumed to be more successful in using resources for the renewal of supply portfolios. Large-scale organizations generally have a relatively high number of specialists in the field of research and development who contribute to product and service innovation (Mintzberg, 1983).

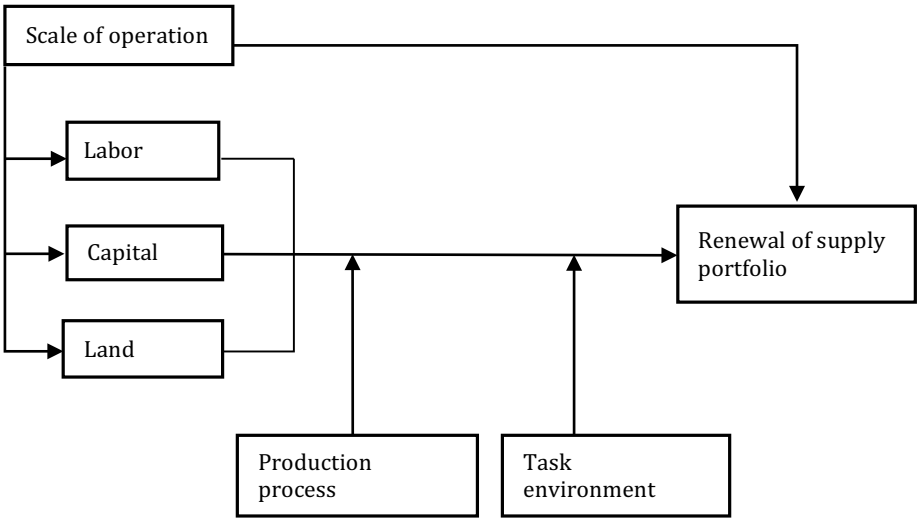
So, large-scale organizations are presumably better equipped to safeguard relevant resources and utilize these resources for the renewal of supply portfolio's than small-scale ones. There is, however, probably a turning point at a certain scale of operation.

First, large organizations tend to diversify, and the larger an organization grows, the more likely it is that it will gradually fall apart in a number of smaller, autonomous divisions that must procure their own resources (Mintzberg, 1983). Second, if an organization is operating on a too large scale, there is a risk of extensive bureaucratization or red tape (Bozeman & Scott, 1996; Feeney & DeHart-Davis, 2009). Both circumstances will restrict the organization's capacity to safeguard relevant resources and utilize these for product and service innovation. Finally, there is also a risk that ambitious managers of big organizations start prestigious, expensive projects that mainly serve as a means to gain personal power, prestige, and benefits, neglecting the need for portfolio renewal (Williamson, 1964; Mueller, 1969; Rhoades, 1983).

Another theoretical assumption is that the degree in which the organization's supply portfolio is periodically renewed, not only depends on the access to relevant resources. There is presumably also a *direct* relation between the scale of operation and the strategic position of the organization (Damanpour, 1992; Camisón-Zornoza et al. 2004).

A last theoretical assumption is that characteristics of the task environment moderates the relation between the organization's resource dependency and the periodic renewal of the organization's supply portfolio (Walker et al., 2015).

Figure 3 Relation between scale of operation and renewal of the supply portfolio, mediated by the availability of relevant resources and moderated by production process and task environment



In line with the above model and assuming that characteristics of the production process do not vary across the population of housing corporations, in our analyses of the strategic position of Dutch housing corporations, we will address the following specific research questions: What are relevant units of output to assess the renewal of the supply portfolio of housing corporations? To what extent is there a relation between the scale of operation of a corporation and the renewal of the corporation's supply portfolio mediated by the corporation's access to relevant resources, if we control for scale of operation and characteristics of the task environment?

DATA AND METHODOLOGICAL ISSUES

The specific research questions raised in the previous section have been answered by means of quantitative analyses of data from a comprehensive dataset on the Dutch social housing sector. The data were prepared to enable statistical testing of economies of scale, economies of scope, and the relation between scale and strategic position. First, we discuss the way the data were prepared for statistical analysis.

Data sources and preparation

The analyses were conducted on a comprehensive set of annual accounting data of the whole population of Dutch housing corporations spanning a period from 2002 to 2012. The data were collected and delivered by a state agency, namely the Central Housing Fund (CFV). Environmental data on demographics and physical working circumstances were taken from the site of Statistic Netherlands (CBS). Due to mergers, the population shrunk from 552 entities in 2002 to 376 at the end of 2012.

Many attributes of the CFV database were converted to ratios in order to arithmetically eliminate differences between the inputs from small and large corporations. For instance, the input values of costs were divided by the number of rental housing units in stock of each corporation. Doing so, the cost levels of small and large organizations became comparable.

The use of highly specified models with a lot of variables brings about the risk of multicollinearity, which could result in the distortion of correlation coefficients and

significance values (Field, 2013). For instance, the variables from the CBS database entail the risk of multicollinearity, especially between the concentration of postal address, the population share of non-western immigrants, and the share of welfare recipients. The risk was reduced to an acceptable level by checks before and after analyses and, if necessary, the exclusion of variables.

Linear regression analysis makes demands on the distribution of scores on the values of variables. Although these demands are lower for independent variables, it was a problem that the variable Scale of Operations, which was measured as the number of rental housing units in stock, appeared to be extremely skewed to the right.

The distribution of the values within the population with many small corporations and a few big and even fewer very big ones, would affect the reliability of the findings. Therefore, this crucial variable was converted into a logarithmic scale.

Independent and dependent variables were tested on extremes and outliers: these were removed. The justification for not selecting the whole population but skipping extremes and outliers was that our aim was to find regular patterns in the relations between variables.

After the preparation, dependent variables were tested successfully on normality. Due to the removal of observations the dataset was reduced. After this reduction, the dataset was still large enough for a chance on significant findings.

The residuals of all linear regressions were assessed on normality and linearity by a visual inspection of scatterplots, P-P plots and histograms. The test showed there was no need to withdraw significant findings.

Cross-sections and time series

Economies of scale were analyzed using combinations of cross-sectional and longitudinal data. These combinations are susceptible to autocorrelation or, in other words, serial correlation. Regression analyses were checked for autocorrelation by the Durbin-Watson algorithm also in compliance with common rules of thumb (Field, 2013:311). Without exclusion, autocorrelations did not exceed thresholds of acceptability.

For the analyses of economies of scope and strategic position, the dataset was adapted and converted into a new one. The cases were aggregated across time. The records from 2002 to 2012 were summed and converted into ratio's. This was done because of the a-synchronism between costs and results of investment and divestment projects. These projects usually require more preparation time than the operations of housing exploitation. The aggregation across time entailed the problem of an unstable population. The population of housing corporations started with 552 organizations in 2002 and ended with 376 in 2012, due to mergers in all interceding years. It was decided to join the predecessors to the 376 organizations that remained ultimo 2012, and to add the scores of predecessors to the ones of the successors.

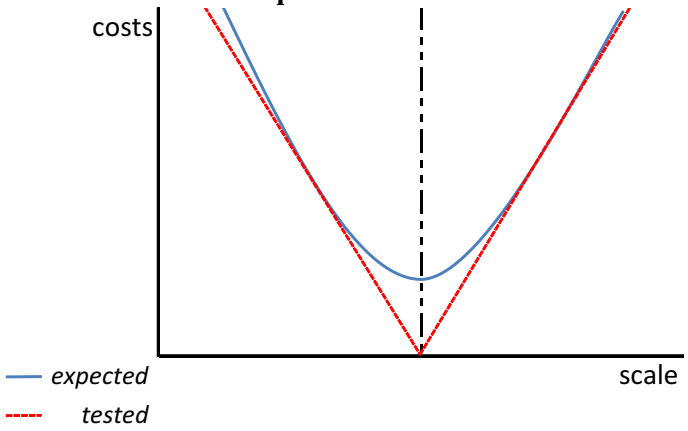
RESULTS

Economies of scale: operationalization and research findings

The main assumption concerning economies of scale is that costs depend on the scale of operation. As argued before, research on economies of scale suggests a u-curve is to be expected, resulting from two opposing effects, namely decreasing costs because of an extended base for fixed costs and specialization, and increasing costs due to increasing managerial

efforts.

Figure 4 Economies of scale: expected curve and trend lines to be tested



The resulting graph will not necessarily represent a symmetric curve. As the two opposing trends are relevant, measurements were set up in order to find two straight line segments, deflating to and inflating from a yet to be determined scale level. At this level, the costs are at a minimum and efficiency, therefore, at an optimum.

Operationalization

The number of housing units in stock was taken as the measure for the variable Scale of Operation. Costs were divided by the number of housing units in stock. There are three types of costs: Operational Costs, Costs of Property Maintenance, and Financial Costs.

The turning points tested were located at 1000, 2500, 3500, 5000, 7500, 10000, and 20000 housing units. Previous research suggests that the number of 2500 housing units is a probable optimum for efficiency (Veenstra, Koolma & Allers, 2017). Cloudt (2015) finds a maximum of 5000 for optimal service to clients. In the Dutch state regulation, 10000 units is a scale level above which merger proposals are assessed more rigorously, because at higher scale levels, a loss of efficiency and effectiveness is expected. Around these three scale levels, four more levels were pinpointed.

Control variables

As stated before, some publications on scale effects suffer from under-specification. Apart from scale or scope, costs may be related to characteristics of the task environment that influence the complexity of operational processes (Figure 1). In the analyses, such characteristics should be treated as control variables. The selection of control variables requires specific insight into production processes of the industry under research.

Previous explorative research by Koolma (2008) with the 2002 sample of the data suggests that there is a positive relation between operational costs on the one hand and the number of contract turnovers and the number of houses assigned to low income tenants and aged people (both in relation to the number of contract turnovers) on the other. The research by Koolma (2008) also suggests that costs are positively related to the rate of urbanization (operationalized as the concentration of postal addresses), as a high urbanization rate implies a high population share of non-western immigrants and welfare recipients. These groups, juveniles, and aged inhabitants are expected to put higher demands on social aspects of the operations.

It is also necessary to control for characteristics of the housing stock, because maintenance costs are positively related to the age of construction, poor construction quality, floor surface, and swampy soil. Single family houses involve higher maintenance costs than apartments. To take these characteristics into account, the share of the housing stock built before World War II (aged construction), the share built between 1945 and 1960 (poor quality), the average floor surface, the presence of swampy soil, and the share of single family houses were used as control variables.

A number of these characteristics also have an impact on the financial costs. Due to redemption schemes, aged housing stock is expected to be negatively related to financial costs. Single-family houses and a high level of floor surface are indicators for more expensive production in the past and therefore, higher financial costs in the present.

Lastly, we controlled for investments and divestments related to the housing stock, such as the construction of new houses, the sale of existing stock, and the reconstruction or demolition of existing stock. These activities are assumed to correlate positively to operational costs (more activities), negatively to maintenance costs (smaller or better stock) and positively or negatively to financial costs, depending on whether it concerns investments or divestments.

Research findings

The results of the analyses concerning economies of scale are presented in Table 1.

[Table 1; see at the end of this article]

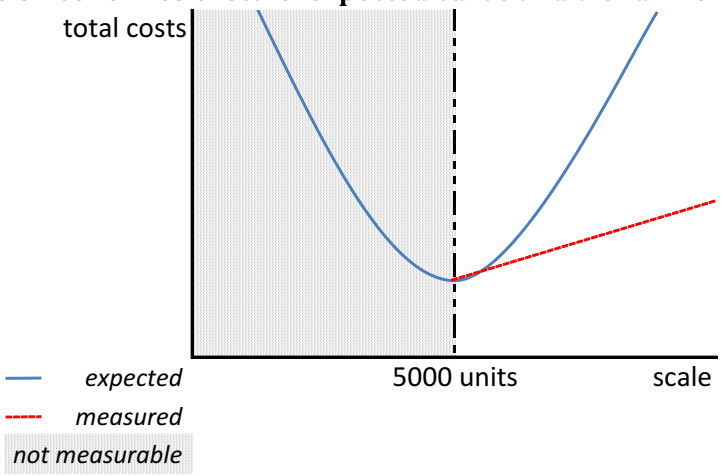
Economies of scale up to a certain turning point would be represented by a combination of a decreasing trend below the split level and an increasing trend above the split level. The analyses showed that economies of scale only occurred with respect to *Financial Costs* up to a level of 5000 units. The combination of a decreasing trend at the left panel and an increasing trend at the right panel was only found in the results of the Financial Costs at 5000, 7500, and 20000 units.

Remarkably, *Operational Costs* and *Maintenance Costs* have positive signs both below and above the split levels. This implies that are no scale advantages measurable. There are some indications that the increasing trend of operational and maintenance costs turns into a flat course at 10000 and 20000, suggesting a decreasing scale disadvantage. However, the coefficients of the left panels do not decrease too, while shifting from 7500 to 10000 and from 10000 to 20000 units. So, the observations are not consistent, and therefore it is likely that the flattening course in the right panels at 10000 and 20000 has to be attributed to a low number of observations and a consequent loss of significance.

In sum, financial costs show economies of scale up to 5000 units. Total costs have no significant relation to scale up to 5000 units, and show diseconomies of scale above that level.

We conclude this section on economies of scale with a comparison between the expected curve, and the course of the trend lines of total costs at 5000 units. For the record, there was no expectation about the scale level at which a trend change would occur. The contrast between the expected course and the measured relation between scale of operation and costs is illustrated in Figure 5.

Figure 5 Economies of scale: expected curve and trend line found

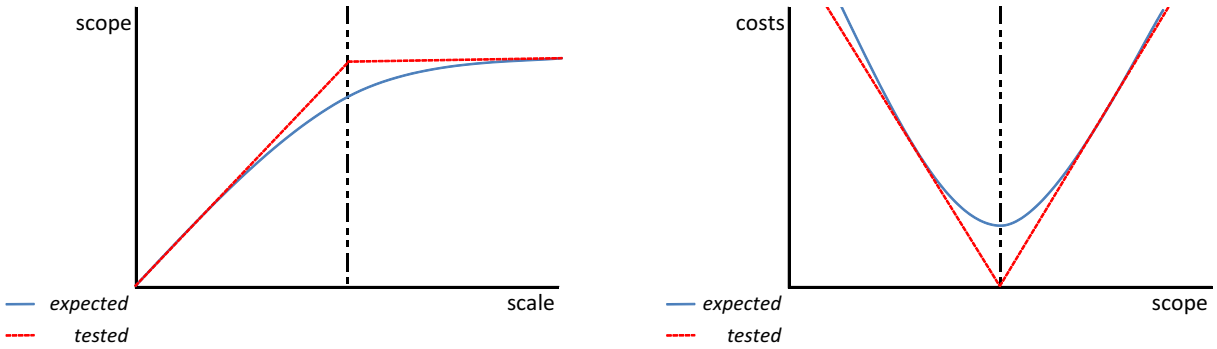


The dotted area at the left side of figure 5 represents non-significant findings. As stated before, only increasing costs are found departing from the scale level of 5000 housing units in stock. A scale dependent decreasing costs trend is absent, contrary to propositions and findings in literature. A likely explanation is the presence of so-called pooled resources. For instance, systems for the marketing and supply of houses are shared among corporations and charged for a flat fee per housing unit in stock. Information and communication services are usually delivered for flat fees too. Employees perform administrative tasks without expensive equipment. So, small housing corporations are probably less faced by a disadvantageous ratio between fixed costs and the number of contracts, clients and so on, than organizations in other industries.

Economies of scope: operationalization and research findings

To assess whether economies of scope are present in the sector of Dutch housing corporations two-stage analyses were carried out. First, we related the scope of corporations to scale. Subsequent analyses concerned the relation between scope and costs.

Figure 6 Economies of scope in two stages: expected curves and trend lines to be tested



A first assumption was that there is a positive relation between scale and scope up to a certain scale level. Above that level an increase in scale does not affect the scope of an organization, which is represented by the flat line segment at the right side of the first graph. A second assumption was that scope and costs are associated in the form of a u-curve.

Operationalization

As in our analysis of economies of scale, *Scale* was measured by the natural logarithm of the number of housing units in stock. *Scope* was measured by assessing the scores on the

investment and divestment activities. These activities are additional to the common exploitation activity (housing management).

There are five-types of production activities, namely the construction of rental houses, the construction of houses for sale, the sale of houses from the rental exploitation stock, the reconstruction of houses, and the demolition of houses. The measurement of scope was dichotomized, where 0 represents no activity and 1 for an annual production of more than 1 housing unit. For each type, the dichotomous scores were summed across the 11 years. The sums were corrected for fluctuations across years. The algorithm for this correction is the mean divided by the standard deviation. As a consequence, the scope variable is independent of the level of production. Otherwise scope would arithmetically correlate to the Costs variable. The *Costs* variable is the operational costs divided by the number of housing units produced and housing units reconstructed. The cost base differs from the one of economy of scale, where the costs were divided by the number of housing units in rental exploitation. Scale split levels to be tested were pinned at 1000, 2500, 3500, 500, 7500 and 10000. Due to the aggregation across the years (see data preparation), the number of observations were roughly divided by 11. Above 20000 housing units the number of observations would be too low for significant findings, so this turning point was omitted.

Control variables in the second stage of analysis

The selection of control variables for economies of scope was reduced to the ones that are associated with the techno-physical aspects of building. Higher building density involves more costs of production, so postal concentration is assumed to positively relate to costs, just like swampy soil. Stock characteristics such as single-family houses share and average floor surface are indicators for less effort in meeting present housing standards, so these variables are expected to have a negative relation to costs. In contrast, aged property and poor building quality imply more effort and higher costs. After testing for multicollinearity, the single-family variable was dropped because of interference with the postal concentration variable.

Finally, economies of scope were controlled for the scale of operations. This was done in order to establish to what extent scale autonomously influences operational costs per housing unit of production, bypassing the mediating scope variable. Considering the persistent positive relation between scale and operational costs in the previous section, an autonomous effect is likely to occur.

Research findings

Our first analyses concerned the relation between scale and scope (panel A of Table 2).

[Table 2; see the end of this article]

The combination of a significant positive coefficient left of the split-level point and a non-significant result at the right side was found at 5000, 7500, and 10000 units. At the 10000 level, the coefficient is decreasing compared to the other points, but it is still strong and significant. This finding justifies the conclusion that scope is positively related to scale at least up to a level of 10000 units of rental houses in stock.

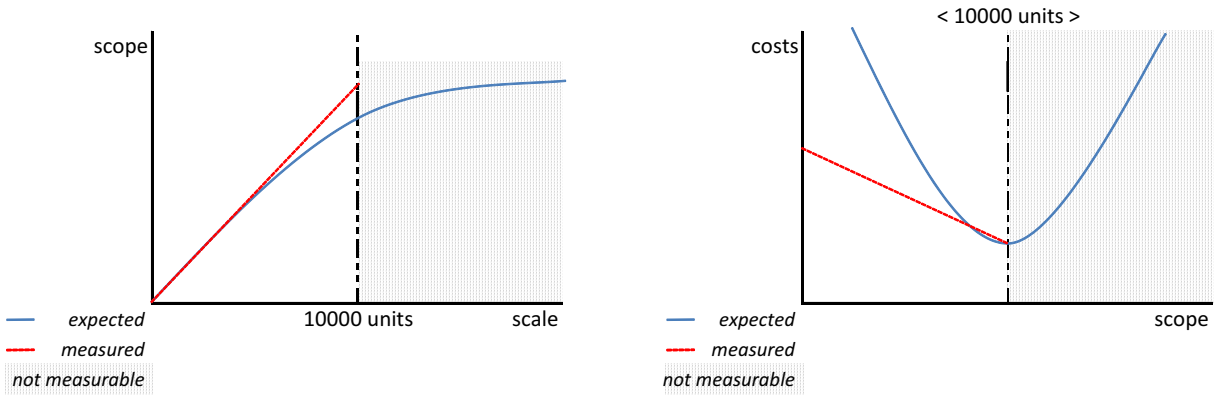
The subsequent analyses showed a negative relation between scope and operational costs per housing unit produced up to the scale level of 10000 units in stock (panel B of Table 2). So, an increase of scope contributes to efficiency in the scale range from 0 to 10000 units.

Moreover, we found an increasing positive relation between the scale of operation and costs

(panel B of Table 2). Remarkably, at the 10000-unit level, the impact of scale approximates the impact of scope. The implication is that economies of scope are almost entirely neutralized by diseconomies of scale. Although the lack of significance does not allow for conclusions, it suggests that at levels over 10000 units, scale effects will neutralize or even outweigh scope effects. In other words, if diversified corporations become larger than 10000 housing units, marginal operational costs will increase.

In Figure 7, the expected curve and measured trend lines converge in the scale to scope graph. In the scope to costs graph, it is undetermined whether an increase in scale above 10000 units will cause an increase in costs. At the right side of the scope to costs graph, the expected curve and measured trend line do not converge due to the lack of significant findings.

Figure 7 Economies of scope in two stages: expected curves and trend lines found



So, in the scale range from 0 to 10000 units, our research findings support the assumption of economies of scope. Above that scale level, it was not possible to make assessments about economies of scope. A likely explanation for the limits to economies of scope are found in the production process. Supply of housing is bounded by a geographical span of control. Up-scaling usually entails the use of more front-offices. Housing corporations are obliged by law to negotiate and covenant with local authorities and tenant organizations. Furthermore, housing markets are regionally specific. So, up-scaling will require splitting up staff and management. Economies of scope originate from combining activities, while economies of scale from a certain level require dividing activities in separate geographically bounded units. This counteracting effect of scale on economies of scope is caused by the characteristics of the production process of housing corporations.

Strategic position: operationalization and research findings

The relation between scale and strategic position was analyzed in two stages as well. First, we looked at the relation between the scale of operation and the access housing corporations have to resources. The second step concerned the analyses of the relation between the access to resources and portfolio renewal. It showed whether the resources a corporation has at its disposal are actually used for portfolio renewal.

Operationalization

As in the previous analyses, scale was operationalized as the natural logarithm of the number of housing units in stock.

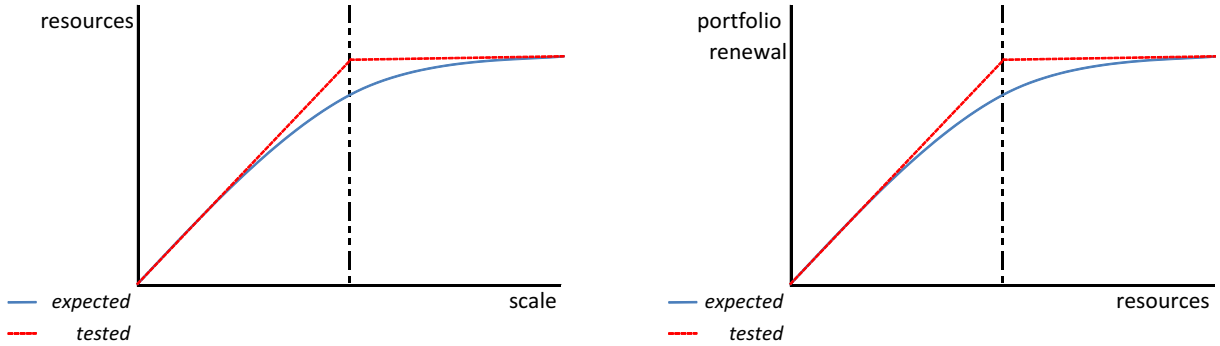
In reminiscence of Ricardo (1821), we distinguished between three classic production factors labor, capital, and land. Labor was sub-divided into three categories: quantity, quality and diversity. In order to obtain a measure for access to qualified personnel, the quantity of

personnel was measured as the ratio of full time equivalents to the number of housing units in stock. The scope variable was added as a proxy for the rate of diversification of the personnel. The level of long-term debts per unit in stock represented the variable for access to capital. The access to land was measured in terms of the acreage of bare building land rated to the number of housing units in stock. Housing corporations have also acquired land that cannot be built on for a certain period due to public law restrictions. This was conceived as a non-utilizable resource, and excluded from the input of the regression models.

To measure the dependent variable, the degree of portfolio renewal, the number of rental housing units built divided by the number of rental houses in stock was taken as a proxy.

Based on our discussion of the literature, we would expect positive relations between scale and the access to resources, and between the access to resources and portfolio renewal, with coefficients that become smaller and tend to zero above a certain level. Our test implied regression analyses at different split levels.

Figure 8 Strategic position in two stages: expected curves and trend lines to be tested



Scale split levels were located at 1000, 2500, 3500, 5000, 7500 and 10000. In the left graph, the access to resources depends on scale up to a yet undetermined scale level. Above this level scale dependency of resources disappears.

Control variables in the second stage of analyses

In the tests concerning the relation between the access to resources and portfolio renewal, a number of control variables were used. Urbanization (postal concentration) and swampy soil were assumed to complicate the construction of new houses. The higher the technical and housing quality of the current portfolio, the less renewal of the portfolio was expected. These three factors thus were assumed to negatively relate to portfolio renewal. The sale of rental houses is a way to generate capital. Demolition of houses is a means to recreate land that is suitable for building. Therefore, both variables represent intra-firm short cuts to resources, and are likely to have a positive effect on the rate of renewal.

Finally, the relation between resources and portfolio renewal was controlled for the scale of operations. The question was whether scale has an autonomous influence on the renewal of the portfolio of rental housing, bypassing the intermediate variables representing the resources. In an analysis of the 2002 dataset, Koolma (2008) found a dominant negative effect of scale on the production of rental houses. Therefore, autonomous influence is likely to occur.

Research findings

The first question was whether the access to resources depends on the scale of operation. The trend line pattern searched for is a positive coefficient in the range to the scale split and a

coefficient approximating zero above the split level. Findings are presented in panel A of Table 3.

[Table 3; see the end of this article]

Only two of the personnel variables at some split-level points showed this pattern. The first one is the relative amount of personnel. The turning point was found at the level of 7500 housing units. However, at lower split-level points observations diverged. For instance, above 2500 units the amount of personnel was significantly related to scale, suggesting that the marginal increase in access to resources for large corporations is higher than for small corporations.

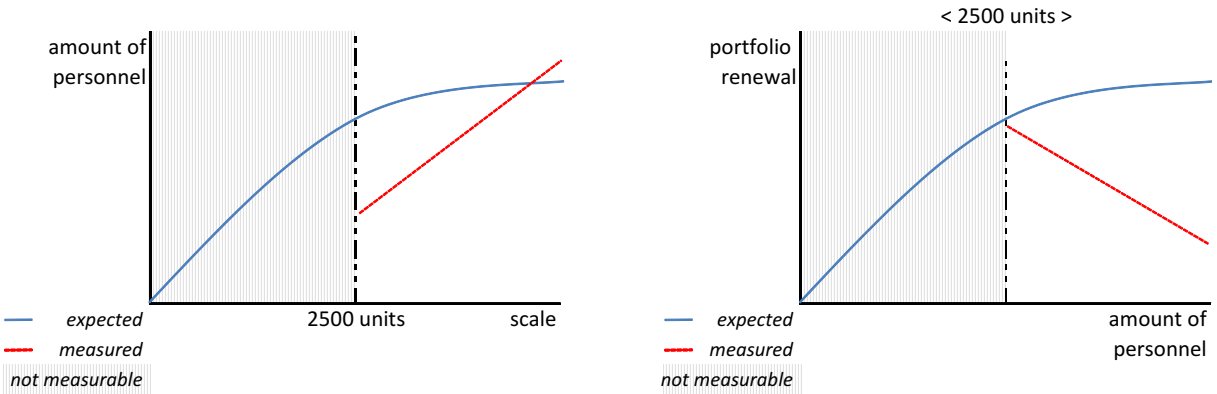
With respect to the diversity of personnel, turning points were found at the split-levels of 5000, 7500, and 10000 units, where the 10000-unit level presented the best fit. Also with this variable, the sequence of findings across the scale levels was not consistent. For instance, at the 1000, 2500, and 3500 a positive relation was found above the scale levels.

The analyses showed that the quality of personnel, capital costs, and land are resources that do not have the relation to scale of operation as sought for. So, we proceeded to the next step with the amount of personnel and the diversity of personnel (panel B of Table 3). At both sides of the 7500 units level, the amount of personnel had no significant relation with the renewal of the rental portfolio. The diversity of personnel showed a trend change from positively significant to non-significant. However, the coefficient for the subset above 10000 units was negative, and furthermore, the right-sided model exceeded acceptable levels of multicollinearity. Therefore, a result can't be stated.

In the second stage, the selected variables failed to present trend courses at all split levels excluding 10000, which point had been dropped in advance. Only at the split level of 2500 units, both variables related significantly to the renewal of the rental portfolio. However, the sign was negative for the amount of personnel. For the diversity of personnel, the relationship was positive, but of less influence.

In our analyses, scope was used as a proxy for the diversity of personnel. Scale as control variable even outweighed the positive effect of scope on the rate of portfolio renewal. Considering this, we limited the analysis to the relation between Scale of Operation, Amount of Personnel and Portfolio Renewal. The findings are presented as drawings in the next figure.

Figure 9 Strategic position in two stages: expected curves and trend lines found



At 2500 units, the trend lines in the scale to amount of personnel graph look like the mirror image of the expected curve. Up to 2500 units there is no significant relation between scale and relative amount of personnel. Below 2500 units the access to personnel is independent from scale of operation. Expected was scale dependency up to a certain, undetermined scale level. Contrarily, scale dependency of the quantity of personnel was observed in the range above 2500 housing units. The larger the corporation the more access it has to personnel. This is a first indicator for the strength of an organization's strategic position.

In the right graph the question is whether access to resources leads to a higher level of portfolio renewal. The expectation was that the increase in portfolio renewal would flatten out above a certain, undetermined amount of personnel. Instead of a flat trend, a decreasing trend was found, reading that the more personnel are employed the lower will be the level of portfolio renewal. In terms of strategic position, scale gives access to more personnel; however, this strategic advantage has a contrary effect on the rate of portfolio renewal.

Usually, a strong strategic position is associated with large-scale business operation. In our analyses of the Dutch housing corporations, the findings were contrary to the expectations. For small corporations up-scaling did not lead to better access to resources. Aforementioned, the availability of pooled resources in the Dutch social housing sector has created circumstances in which small organizations do not suffer a disadvantage due to their scale. The flat trend at all splitting points for the resource Capital shows evidence for the effect of pooled resources. Dutch housing corporations have shares in a mutual guarantee fund that provides equal access to the capital market.

Furthermore, figure 9 suggests that larger corporations show over-collection with respect to the amount of personnel. A likely explanation for the intriguing observation that more personnel leads to less portfolio renewal is that resources in access are utilized for activities that do not contribute to the cause and purpose of social housing. This is supported by the observation that the management of commercial real estate is positively related to the amount of personnel in the scale range from 2500 up ($R = 0.246$ $p < 0.000$). We hypothesize that these activities consume managerial attention at the expense of portfolio renewal in social housing.

Dutch housing corporations have grown too big

One of the goals of our research was to obtain an integrated picture of the effects of the upscaling of Dutch housing corporations, in terms of economies of scale, economies of scope and strategic position. In perspective of our findings concerning optimal scales, how does the composition of the population of Dutch housing corporations compare? First, the analyses show that if the scale of operation surpasses 5000 housing units, diseconomies of scale occur. Notwithstanding, ultimo 2012 35.4 % of the housing corporations were operating at a scale level above 5000 units in stock. A closer look at the research data reveals that 72,5 % of the housing corporations that merged in the period between 2002 and 2012 established a scale level above 5000 units (CFV, 2012).

Second, the analyses show that there is a positive relation between diversification and efficiency. However, the findings suggest that economies of scope are outweighed by diseconomies of scale, once the 10000-unit level is reached. Notwithstanding, ultimo 2012 16.5 % of the housing corporations were operating at a scale level above 10000 units in stock. A closer look reveals that 41.9 % of the housing corporations that have merged in the period between 2002 and 2012 established a scale level above 10000 units (CFV, 2012). Since 2015, merger proposals that establish scale levels above 10000 housing units are subject to more scrutinized assessments by the state agency. It is not clear whether this new regulatory

practice will depart from the permissiveness of the period before 2015.

Third, our analyses show that there is no relation between the scale of operation and the access to resources, with only one exception: from a scale of 2500 units up, corporations have better access to personnel. However, this strategic advantage does not pay out, as it turns out that there is a negative relation between the amount of personnel and portfolio renewal. Nevertheless, ultimo 2012 53.4 % of the housing corporations were operating at a scale level above 2500 units and 89,7 % of the housing corporations that have merged in the period between 2002 and 2012 established a scale level above 2500 units.

While optimal scale levels differ, depending on whether one looks at efficiency or strategic position, the overall picture is that a substantial part of the Dutch housing corporations operates on disadvantageous scale levels, a part that has increased by merger decisions. One can hypothesize about the reasons for managers to engage in mergers that do not contribute to the efficiency or long-term survival of their organization. The literature offers possible explanations (cf. Williamson, 1964; Mueller, 1969; Rhoades, 1983). However, it would require detailed event studies to make positive statements about which of these explanations holds. Our research provides insufficient basis for that.

DISCUSSION

The aim of our endeavour was to contribute to the theoretical and practical debate on the effects of increasing the scale of organizations. Two issues were at stake.

First, so far, research and analyses have focussed on the relation between the scale of organizations and their efficiency, largely neglecting the relation between scale, scope, and strategic position. From a practical perspective this is unsatisfactory, because decisions about organizational scale, mergers or breaking up large organizations, should not only take into account short term costs, but also the advantage of combining activities and the impact on long-term survival.

Second, research and analyses on scale effects tend to they take a limited number of variables into account and sometimes resort to simple measures for output. In this article, we have tried to address both issues: to develop a sophisticated method to analyse the effects of scale in terms of both efficiency and strategic position of an organization. We applied this method to a specific case to assess its usability.

Developing a sophisticated method, the basic assumption was that to attribute scale effects to the role of fixed capital goods, specialization, and management and coordination – being factors that the theory holds responsible for economies and diseconomies of scale - it is necessary to take into account the characteristics of the production process and the task environment of an organization. This requires a thorough knowledge of the sector in which an organization operates. Applying our method to the sector of Dutch housing corporations, we selected a series of control variables, largely based on previous research concerning the cost structure of a corporation's operations. Whether the analyses carried out provide a valid picture of the relation between scale, efficiency, and strategic position depends on the adequacy of this selection.

Our analyses showed that we selected relevant control variables. For instance, controlling for characteristics of the task environment, the contribution of the scale variable to the explanation of the variance of operational costs decreased from 4.8% to 2.1% above the 5000

units turning point. Simple bivariate models or isolated event studies would exaggerate the effect of scale on efficiency in this case. Our method appeared therefore useful to determine scale effects in terms of efficiency and strategic position.

The research findings obtained by applying the proposed method are relevant from a practical perspective. They show that the optimal scale of an organization in the Dutch housing sector differs depending on which criterion is used. When economies of scale are concerned, turning points are located at 5000 housing units in stock. From the viewpoint of economies of scope, the optimum level is at 10000 housing units. Remarkably, the optimum for strategic position is found at 2500 units in stock.

So, the choice of an optimum for scale of operation will depend on the question which criterion is prevalent. There is no reason to assume that optimal scales in other industries simply coincide. It shows that the choice of scale is not a straight forward problem and requires a sophisticated approach.

Our research also produced findings that are theoretically relevant. The economy of scale literature assumes a u-curve with a range of economies of scale turning to diseconomies of scale (Boyne, 1992; Allan, 2003; Dollery & Fleming, 2006). Economies of scale are absent in the Dutch social housing sector. This finding can be explained by the effect of pooled resources. Pooled resources are available when organizations establish co-operation. In the literature, the phenomenon of co-operation between business firms and the use of pooled resources is acknowledged and subject of research (Brandenburger & Nalebuff, 1996; Padula & Dagnino, 2007; Thomason et al. 2013). Our findings suggest that in non-profit sectors specific forms of pooled resources may be present, such as capital funds the organizations have access to. Also, in non-profit sectors pooled resources may play a more prominent role because of a lower degree of competition, government regulation and the presence of strong branch organisations. All in all, the role of pooled resources in issues of scale and efficiency of non-profit organisations would be a relevant line of further investigation.

Economies of scope appear to be counterbalanced by diseconomies of scale. Apart from the general explanation of rising costs of management and coordination, the findings concerning the Dutch housing sector suggest that other explanations may be valid. One is that diseconomies of scale result from the need to set up separate production or service centres to deal with a bounded geographical span of control. If that is the case, diseconomies of scale may neutralize economies of scope at relatively small organizational scales. This is a phenomenon which is likely to occur in more industries with a land-bound service. It underlines the need to have a thorough knowledge of the sector under research.

Finally, as strategic position is concerned, the trends found are wholly contrary to theoretical expectations, which can at least partially be explained by the presence of pooled resources discussed above. The other contrary finding is that the larger the amount of personnel the lower the rate of portfolio renewal. We attribute this finding to the over-collection of resources (cf. Penrose 1959). Excess resources are used for side-line activities that distract managerial attention from the renewal of the core portfolio. We assume that over-collection of resources will occur in other non-profit sectors too, when strategic objectives are shifted to commercial activities. This would justify further research into the role of government, as many non-profit organisations are active in sectors where government regulation and oversight are more prominent than in most business sectors.

BIBLIOGRAPHY

Allan, P. (2003). Why Smaller Councils Make Sense. *Australian Journal of Public Administration,* Vol. 62, Issue 3, 74-81.

Amey, L.R. (1964) Diversified manufacturing businesses. *Journal of the Royal Statistical Society*, 27, series A, part 2.

Aw, B-Y. & G. Batra (1998) Firm size and the pattern of diversification. *International Journal of Industrial Organization*, 16, 313-331.

Bel, G. (2012). *"Local Government Size and Efficiency in Capital Intensive Services: What Evidence is There of Economies of Scale, Density and Scope?* International Center for Public Policy Working Paper Series, 65.

Ben-Menahem, S.M, Kwee, Z., Volberda, H.W., & Van den Bosch, F.A.J. (2013). Strategic Renewal Over Time: The Enabling Role of Potential Absorptive Capacity in Aligning Internal and External Rates of Change. *Long Range Planning*, Vol. 46, Issue 3, 216–235.

Berger, B.K, Hertog, J.K. & Park, D-J (2002). The Political Role and Influence of Business Organizations: A Communication Perspective. *Annals of the International Communication Association*, Volume 26, Issue 1, 160-200.

Bozeman, B. & Scott, P. (1996) Bureaucratic Red Tape and Formalization: Untangling Conceptual Knots. *The American Review of Public Administration,* Vol 26, Issue 1, 1 – 17.

Boyne, G. A. (1992). Local Government Structure and Performance: Lessons from America? *Public Administration* 70 (3), 333-357.

Brandenburger, A. M. & Nalebuff. B. J. (1996) *Co-opetition*. Harvard Business School Press: Boston, MA.

Byrnes, J. & Dollery, B. (2002) Do Economies of Scale Exist in Australian Local Government? A Review of the Research Evidence. *Urban Policy and Research*, 20:4, 391-414.

Camisón-Zornoza, C., Lapiedra-Alcamí , R., Segarra-Ciprés,

M. & Boronat - Navarro, M. (2004). A Meta-analysis of Innovation and Organizational Size. *Organization Studies*, Vol 25, Issue 3, 2004, 331–361.

CFV. (2012). *Jaarverslag 2011* [Annual Report 2011]. Naarden: Centraal Fonds Volkshuisvesting.

Chae, S., Heidhues, P. (2004). Buyers' Alliances for Bargaining Power. *Journal of Economics & Management Strategy*, Volume 13, Issue 4, 731–754.

Cloudt, S. (2015). *Organizational configurations and performance of Dutch social housing associations.* Tilburg: Tilburg University.

Dass, P. (2000) Relationship of Firm Size, Initial Diversification and Internationalization with Strategic Change. *Journal of Business Research*, 48, 135-146.

Damanpour, F. (1992). Organizational Size and Innovation. *Organization Studies*, Vol 13. Issue 3, 375–402.

Davis, G.F. & Cobb, J.A. (2010) Resource dependence theory: Past and future, in C. Bird Schoonhoven & F. Dobbin (ed.) *Stanford's Organization Theory Renaissance, 1970–2000*. Bingley: Emerald, 21 – 42.

Dollery, B. & E. Fleming (2006) A Conceptual Note on Scale Economies, Size Economies and Scope Economies in Australian Local Government. *Urban Policy and Research*, 24, 2, 271-282.

Feeney, M.K. & DeHart-Davis, L. (2009) Bureaucracy and Public Employee Behavior: A Case of Local Government. *Review of Public Personnel Administration*, Vol 29, 311-326.

Field, A. (2013). Discovering Statistics using IBM SPSS Statistics. Thousand Oaks, CA: Sage.

Foley, D. K. (2003). *Unholy Trinity: Labor, Capital and Land in the New Economy*. London and New York: Routledge.

Given, R. (1996) Economies of scale and scope as an explanation of merger and output diversification activities in the health maintenance organization industry. *Journal of Health Economics*, 15, 685-713.

Gort, M. (1962). *Diversification and Integration in American Industry.* Princeton: Princeton University Press.

Hillman, A.J., Withers, M.C. & Collins, B.J. (2009) Resource Dependence Theory: A Review. *Journal of Management*, Vol 35, Issue 6, 1404 – 1427.

Koolma, H. M. (2008). *Verhalen en prestaties. Een onderzoek naar het gedrag van woningcorporaties [Stories and Achievement. An inquiry into the behavior of housing corporations].* (PhD-thesis, Vrije Universiteit Amsterdam).

Koolma, R. & Van Montfort, A. (2016). Aan mooie woorden en ambities geen gebrek, De stuurloze koers van woningcorporaties. In Buijs, G. & Hoogland, J. (Eds), *Ontzuilde bezieling, Transformatie van burgers en maatschappelijke organisaties [Depillarized inspiration, transformation of citizens and civil society organizations].* The Hague: Boom Bestuurskunde, pp. 57 - 69.

King, D., D. R. Dalton, C. M. Daily & J. G. Covin (2004) Meta-analyses of Post-acquisition Performance: Indications of Unidentified Moderators. *Strategic Management Journal*, Vol. 25, No. 2, pp 187–200.

Lankford, W. M., & Parsa, F. (1999). Outsourcing: a primer. *Management Decision*, Vol. 37, Issue 4, 310-316.

Lichtenberg, F. R. (1992) Industrial de-diversification and its consequences for productivity. *Journal of Economic Behavior and Organization*, 18, 427-438.

Mansfield, E. (1976). Microeconomics. Theory and Applications. New York: W. W. Norton.

Mintzberg, H. (1983) *Structure in Fives: Designing Effective Organization.* Englewood Cliffs NJ: Prentice-Hall.

Mueller, D. C. (1969). A theory of conglomerate mergers. *Quarterly Journal of Economics*, Vol. 83, 643-659.

Padula, G. & Dagnino, G. B. (2007) Untangling the Rise of Coopetition. *International Studies of Management and Organization*, 37, 2, 32-52.

Panzer, J. C. & R. D. Willig (1981) Economies of Scope. *American Economic Review*,71, 268-272.

Penrose, E. (1959) *The Theory of the Growth of the Firm.* New York: John Wiley.

Porter, M. E. (1985) *Competitive Advantage*. New York: Free Press.

Rawley, E. & T. S. Simcoe (2010) Diversification, Diseconomies of Scope, and Vertical Contracting: Evidence from the Taxicab Industry. *Management Science*, 56, 9, 1534-1550.

Rhoades, S. A. (1983) *Power, empire building, and mergers*. Lexington MA: Lexington Books.

Ricardo, D. (1821). *On the Principles of Political Economy and Taxation* (3th Edition). Kitchener, Ontario: Batoche Books.

Sparrow, O., & Ringland, G. (2010). A system for continuous organizational renewal, *Strategy & Leadership*, Vol. 38 Issue 4, 34-41.

Teece, D. (1980) Economies of scope and the scope of the enterprise. *Journal of Economic Behavior & Organization* Vol. 1, issue 3, 223-247.

Thomason, S.J., Simendinger, E. & Kiernan, D. (2013) Several determinants of successful coopetition in small business. *Journal of Small Business & Entrepreneurship,* Vol. 26, Issue 1, 15-28.

Trautwein, F. (1990). Merger motives and merger prescriptions. *Strategic Management Journal* Vol. 11, Issue 4, 283-295.

Utton, M.A. (1977) Large firm diversification in British manufacturing industry. *Economic Journal*, 87, 96-113.

Veenstra, J., Koolma, H.M. & M.A. Allers (2017). Scale, mergers and efficiency: the case of Dutch housing corporations. *Journal of Housing and the Built Environment*, Vol. 32, Nr. 2, 313–337.

Walker, R.M., Berry, F.S., & Avellaneda, C.N. (2015). Limits on innovativeness in local government: examining capacity, complexity, and dynamism in organizational task environments. Public Administration, Volume 93, Issue 3, 663–683.

Williamson, O. E. (1964). *The Economics of Discretionary Behavior*. Englewood Cliffs NJ: Prentice-Hall.

Willig, R. (1979) Multiproduct technology and market structure. *American Economic Review*, 69, 2, 346-351

Table 1 Economies of scale: research findings

Number of housing units in stock	1000		2500		3500		5000		7500		10000		20000	
Depent varaobles	below	above	below	above	below	above	below	above	below	above	below	above	below	above
Operational costs	0.244 ***	0.169 ***	0.245 ***	0.175 ***	0.236 ***	0.175 ***	0.237 ***	0.196 ***	0.232 ***	0.150 ***	0.236 ***	0.045	0.259 ***	0.027
Costs of maintenance	0.092 *	0.149 ***	0.152 ***	0.178 ***	0.125 ***	0.145 ***	0.138 ***	0.093 ***	0.160 ***	0.090 **	0.165 ***	0.040	0.177 ***	0.007
Financial costs	0.127 **	-0.148 ***	0.020	-0.005	-0.042	0.028	-0.071 **	0.110 ***	-0.130 ***	0.068 *	-0.135 ***	0.080	-0.127 ***	0.174 ***
Total costs	0.108 *	0.017	0.079 **	0.081 **	0.026	0.084 **	0.031	0.103 **	0.027	0.077	0.029	-0.033	0.058 **	0.176 *
n (total costs)	460	2107	1138	1429	1357	1210	1951	1028	2367	622	2548	431	2816	163

*independent Scale of operations (log), standardized coefficient flagged for significance *** p<0.001 ** p<0.01 * p<0.05*

Table 2: Economies of scope in two stages: research findings

Number of housing units in stock	1000		2500		3500		5000		7500		10000	
2A First stage	below	above	below	above	Below	above	below	above	below	above	below	above
Depedent Scope												
Independent Scale (log)	0.479 ***	0.398 ***	0.577 ***	0.201 *	0.643 ***	0.198 *	0.616 ***	0.154	0.607 ***	0.134	0.579 ***	0.103
2B Second stage												
Dependent Operational costsper housing unit produced												
Independent Scope	-0.260	-0.254 ***	-0.303 ***	-0.224 **	-0.287 **	-0.225 *	-0.226 **	-0.216	-0.241 **	-0.338	-0.260 **	-0.035
Control variable Scale of operations (log) #	-0.083	0.275 **	0.080	0.183	0.165	0.281 **	0.172	0.229	0.155	0.038	0.203 *	0.002
n (observations)	53	232	126	159	153	132	201	84	234	51	252	33

*Standardized coefficient flagged for significance *** p<0.001 ** p<0.01 * p<0.05*
 # Other control variables are not presented in this table

Table 3 Strategic position in two stages: research findings

Number of housing units in stock	1000		2500		3500		5000		7500		10000	
3A First stage	below	above	below	above	below	above	below	above	below	above	below	above
Independent Scale (log)												
5 Dependents variables in bi-variate tests												
	-	-	'-	-	-	-	-	´-	-	´'-	-	
Quality of personnel	0.09 1 ´-	0.1 64	0.1 23	0.1 00 *	0.1 15	0.0 60	0.1 69	0.04 9 *	0.1 80 *	0.01 7 *	0.1 57 *	0.2 34 *
Amount of personnel	0.16 8	0.4 11 *	0.1 89	0.2 81 *	0.2 75 *	0.2 72 *	0.3 58 *	0.16 6 *	0.4 07 *	0.04 9 *	0.4 45 *	0.1 27 *
Diversity of personnel	0.30 5	0.3 69 *	0.3 64 *	0.2 15 *	0.4 62 *	0.1 94 *	0.4 72 *	0.17 1 *	0.4 57 *	0.13 4 *	0.4 24 *	0.0 72 *
Capital	0.30 9	0.0 36	0.0 25	0.1 17	0.0 - 47	0.0 74	0.0 - 36	0.03 4	0.0 03	0.12 4	0.0 16	0.2 26
Land	0.26 8	0.0 06	0.0 - 31	0.0 - 57	0.0 - 17	0.0 78	0.0 53	0.04 - 0	0.0 31	0.00 - 2	0.0 10	0.1 - 25
3B Second stage												
Dependent Renewal of rental housing portfolio												
5 Independent variables												
	-	-	-	-	-		-	-	-	-	-	
Quality of personnel	0.16 3	0.0 79	0.1 49	0.0 27	0.1 84	0.0 05	0.1 03	0.10 1	0.0 90	0.13 3	0.0 89	0.2 97
Amount of personnel	0.20 4	0.1 - 62 *	0.0 25	0,2 - 39 *	0.0 - 78	0.1 - 72	0.1 31	0.16 5	0.1 19	0.24 7	0.1 42 *	0.3 - 66
Diversity of personnel	0.49 5	0.1 49 *	0.2 38 *	0.1 74 *	0.2 05 *	0.1 70 *	0.1 95 *	0.16 0 *	0.1 83 *	0.25 1 *	0.1 83 *	0.1 96 *
Capital	0.26 2 -	0.4 17 * -	0.5 54 * -	0.3 12 *	0.5 16 * -	0.3 24 *	0.4 80 *	0.24 7 * -	0.4 57 * -	0.22 4	0.4 36 * -	0.0 26
Land	0.15 8	0.0 31	0.0 82	0.0 23	0.0 33	0.0 13	0.0 64	0.00 1	0.0 77	0.10 2	0.0 43	0.2 01
Control variable												
Scale of operations (log) #	- 0.16 7	- 0,1 71 *	- 0.0 36	- 0.1 87	- 0.0 28	- 0.1 88	- 0.0 68	- 0.32 3 *	- 0.0 54	- 0.39 9 *	- 0.0 66	- 0.0 77
n (observations)	26	235	95	166	119	142	167	94	201	60	224	37

*Standardized coefficient flagged for significance *** p<0.001 ** p<0.01 * p<0.05*

 # Other control variables are not presented in this table