DEPARTMENT OF ECONOMICS

RESEARCH MEMORANDUM

THE DIRECTION, MODE AND LOCATION OF
CORPORATE EXPANSIONS

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Abstract

This paper examines data about 498 expansions that 14 large Dutch firms carried out between 1966 and 1982. Our evidence corroborates that horizontal, related and vertical expansions are more beneficial than unrelated expansions. We also find that managers had knowledge of these benefits before the expansion, and improved this knowledge afterwards in case of acquisitions but not in case of start-ups. Finally, we find that foreign start-ups induce relatively large Coasian efficiency gains and that domestic acquisitions induce relatively large gains from market power.

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THE DIRECTION, MODE AND LOCATION OF CORPORATE EXPANSIONS[2]

This paper provides a new methodology to test familiar hypotheses: that strategies of horizontal, related and vertical expansion are more beneficial than a strategy of unrelated expansion. A large body of literature already exists on the relative benefits from these strategies. Most studies have found that firms that have expanded horizontally or diversified into related industries perform better than firms that have diversified into unrelated industries, although an increasing number of studies yields mixed results (Rumelt, 1974, 1982, Montgomery, 1979, 1985, Bettis, 1981, Bettis and Hall, 1982, Palepu, 1985, Varadarajan and Ramanujam, 1987). Mixed results have also been obtained about the relative benefits from vertical and unrelated expansion (Rumelt, 1974, 1982).

In their influential review of this literature, Ramanujam and Varadarajan (1989) point out that the present literature is dominated by cross-section studies of data about firms. Instead, these authors emphasize that '(t)here is .. a need to shift the focus of analysis from overall profiles of firm diversity to individual diversification projects and cumulative diversification experiences'. That is, there is a need for studies that 1) analyze individual diversification projects; and 2) analyze what managers have learned from these projects. This analysis is carried out in the present paper. In addition, we analyze horizontal and vertical expansions.

Our analysis consists of two steps. First, we test the prediction that firms **invest** more in horizontal, related and vertical expansions and less in unrelated expansions than if firms had expanded 'randomly': without considering differential benefits from these various directions of expansion.[1] This provides a test of the hypotheses in conjunction with the assumption of 'ex ante rationality': that managers had (at least some) knowledge of the hypotheses at the time of the expansion and acted accordingly. In the second step we test the prediction that firms **divest** fewer horizontal, related and vertical expansions and more unrelated expansions than if they had divested at random, without considering the differential benefits from the various directions of expansion. This provides a test of the hypotheses in conjunction with the assumption of 'ex post rationality': that managers increased their knowledge of the hypotheses after - and presumably from - the expansions and acted accordingly, or at least that they have done so in the past.[2]

In addition, we derive and test hypotheses about the mode (start-up or acquisition) and location (domestic or foreign) of corporate expansions. We hypothesize that foreign start-ups induce relatively large Coasian efficiency gains and that domestic acquisitions induce relatively large gains from increased market power. These hypotheses are also tested in conjunction with the assumption of ex ante and ex post rationality. All hypotheses are tested on data about 498 expansions that 14 large non-financial Dutch firms carried out between 1966 and 1982.

HYPOTHESES

The first two hypotheses to be tested in this paper are 1) that horizontal and 2) related expansions are more beneficial than unrelated expansions. Since these hypotheses are well known, and since this paper focuses on methodological issues, the discussion of these hypotheses will be concise. Horizontal expansion is expected to be more beneficial than unrelated expansion because of increased gains from market power and because of economies of scale. Related expansion is expected to be more beneficial than unrelated expansion because of economies of scope. Such economies arise when two pro-

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ducts share the use of a common production factor. In a world with transaction costs, it can be beneficial to realize economies of scope and scale within one firm (Teece, 1982). So our first hypotheses are:

H_1 = Horizontal expansion is more beneficial than unrelated expansion;
H_2 = Related expansion is more beneficial than unrelated expansion;

Rumelt (1974) finds that vertically integrated firms are among the worst performers. In his 1982 paper he suggests that this bad performance is due to industry-effects and that, if such effects are controlled for, the performance of vertically integrated firms does not differ from the average performance in their industries. Rumelt does not provide a theoretical basis for this hypothesis, but his evidence is consistent with it. Alternatively, theory about vertical integration is presented by Williamson (1975), who argues that vertical integration allows firms to economize on transaction costs. Also, if two subsequent stages in a production process require similar technological know-how and if it is costly to trade such know-how across markets, vertical integration allows economies of scope. This leads to the following hypothesis:

H_3 = vertical expansion is more beneficial than unrelated expansion;

The hypotheses H_1 - H_3 will be tested in such a way that other dimensions of the firm's expansion strategy: its mode and location, are explicitly statistically controlled for. Hence, as we will explain in more detail in our methodological section, potential omitted variables-problems of previous empirical studies are avoided. Furthermore, insight into differential benefits from various modes and locations of corporate expansions are also interesting in their own right. Below we derive some hypotheses about the mode and location of expansions.

An extensive literature exists on why firms expand internationally through direct investment rather than through licensing or exporting (for overviews, see Rugman, 1985, and Teece, 1986). The Hymer-Kindleberger-Caves industrial organization approach emphasizes the ability of multinational

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enterprises (MNEs) to close markets through product differentiation, distribution networks, and so on, which allows MNEs to reap monopoly gains. Alternatively, the Coasian school of thought emphasizes that direct foreign investment allows firms with unique assets (e.g. brand name) or abilities (e.g. technological or organizational know-how) to economize on transaction costs. Hence costs are avoided that would otherwise occur through licensing, such as technological misappropriation and costly haggling between licensor and licensee, through exporting, such as natural transaction costs and international tariff and non-tariff barriers erected by foreign governments, and so on (Teece, 1981, 1985, 1986).

So the Hymer-Kindleberger-Caves approach argues that MNEs are rent seeking and the Coasian approach argues that MNEs are efficiency seeking.[3] In our view, the two explanations are not mutually exclusive and we expect firms to pursue either strategy, whenever it is profitable.[4] Moreover, we expect that monopoly gains from market closing are relatively large in case firms that already have a large market share increase their market share substantially. This is most likely to happen in case of domestic acquisitions, when a firm that possibly already has a major market share may substantially enlarge its share both because an acquisition increases firm sales substantially and a competitor is neutralized. The resulting market share may be large enough to reap substantial gains from market power. In case of foreign acquisitions, firms usually set out from a much smaller market share. So we predict that domestic acquisitions are more beneficial than foreign acquisitions.[5]

Furthermore, gains from overcoming market failures seem relatively large in case of foreign start-ups, which provide new opportunities to exploit firm specific assets, skills, and so on. These gains are expected to be larger than in case of start-ups on the home market where these assets and skills are already in use. In addition, foreign start-ups enable firms to acquire relevant information about foreign markets and technologies and to channel this information to other plants of the firm or to headquarters. Other advantages of foreign start-ups relative to domestic start-ups are that tariff and non-tariff barriers are overcome and that the firm can offer improved services to its international customers.[6] This leads to the following testable hypotheses:[7]

H_4 = Domestic acquisitions are more beneficial than foreign acquisitions;

H_5 = Foreign start-ups are more benificial than domestic start-ups;

The above theory illustrates that strategic decisions about the mode and the location of corporate expansions are interrelated. This extends previous work on the interrelation of the direction and mode (Simmonds, 1990) and of the direction and location (Geringer, Beamish and daCosta, 1989) of corporate expansions. Furthermore, our theory implies that empirical studies that examine the mode of expansions but not their location may fail to distinguish between two effects that work in opposing ways: gains from increased market power that are relative large in case of domestic acquisitions and Coasian efficiency gains that are relatively large in case of foreign start-ups. In theory, this lack of distinction may explain the inconclusive empirical results in Simmonds (1990) who, contrary to his predictions, does not find that start-ups are significantly more successful than acquisitions. Whether our explanation of Simmonds' inconclusive results is indeed valid is also tested in this paper.

METHODOLOGY

General aspects

Our methodology consists of two steps. The first step is consistent with the methodology that is common in mainstream econonomics. In this step we test the hypotheses in conjunction with the assumption of (at least some) 'ex ante rationality': that managers had knowledge of the hypotheses before the expansion took place and acted accordingly. Hence on the basis of the hypothesis that horizontal expansions are more beneficial than unrelated expansions, we expect that firms invested more often in horizontal expansions (relative to unrelated expansions) than if firms had expanded 'at random': without considering the hypothesized benefits. Similar predictions follow from hypotheses H_2 - H_5. These predictions will be tested in the remainder of this paper.

In our second step we treat the firm's expansion strategy as given, as in most previous studies in the strategic management literature that followed Rumelt (1974). In this step we test the hypotheses in conjunction with the assumption of (at least some) 'ex post rationality': that managers learned about the hypotheses from their experience with expansions. Hence given the hypothesis that horizontal expansions

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are more beneficial than unrelated expansions, we expect that unrelated expansions were divested more often than horizontal expansions, compared to a setting where firms had divested 'at random': without having learned about the hypothesized benefits. Similar predictions follow from H_2 to H_5. These predictions will also be tested in the remainder of this paper.

New about our methodology is that we combine both steps. As mentioned above, the first step: a test of the hypotheses in conjunction with the assumption of ex ante rationality, is common in mainstream economics, although the operationalization of a 'random strategy', to be discussed below, is new. Also it is not new to analyze differences in divestment rates of individual projects, as we do in the second step of our analysis. Differential divestment rates of related and unrelated expansions have previously been analyzed in Porter (1987), although we extend Porter's analysis in several ways: by adding tests about horizontal and vertical expansions, by controlling for potential omitted variables-problems associated with the mode and location of expansions, by calculating the significance of differences in divestment rates, and so on. What is new about our methodology is that the two steps are carried out in one analysis, applied to one data set, and that we are explicit about the assumptions about the rationality of managers in both steps. This methodology allows conclusions about the validity of the hypotheses, about what managers knew about the hypotheses ex ante, and what they learned about them ex post (or what 'cumulative diversification experiences' they acquired). Our test will lead to one of the following 4 results.

I) Significant support for the hypotheses is found in both steps. This corroborates the hypotheses, and that management had some knowledge about them before the expansion took place and learned more about them after the investment. Hence this result is consistent with both ex ante and ex post rationality ('learning by doing');

II) Significant support is only obtained in the first step. This corroborates the hypotheses and that management was aware of them ex ante. Ex post this knowledge was not improved (no 'learning by doing');

III) Significant support is only obtained in the second step. This corroborates the hypotheses and that management had no ex ante knowledge about them, but learned about them by doing;

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IV) No support for the hypotheses is obtained in either step. In this case the hypotheses are not corroborated.

These four possible results are summarized in table 1.

Insert table 1 about here

Details

Next we present a more detailed description of how the two steps are carried out. The first step involves the operationalization of the concept of 'random strategy', where firms choose at random from the set of available investment opportunities, without considering the hypothesized benefits. The opportunity set of investments for the 14 firms in our data set between 1966 and 1982 is operationalized as follows. We take the set of all 498 ventures adopted by these firms during this period. Apparently these ventures were perceived as profitable investments by at least one of the firms in the data set (because of anticipated demand, available technology, etc.). From this opportunity set we calculated the number of horizontal, related and vertical expansions that would have taken place if firms had selected from this set at random, given their actual number of expansions between 1966 and 1982. These numbers are subsequently compared to the observed numbers of horizontal, related and vertical expansions by these firms between 1966 and 1982. If the latter numbers are significantly larger than the former, this supports the hypotheses in the first step. A more detailed description of the calculation is given in Appendix A.

In the second step we examine differences in divestment rates associated with the various directions and modes of corporate expansions. The analysis of individual expansions has several attractive properties compared to the analysis of data at the more aggregate level of the firm. First, the analysis of

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individual expansions is likely to mitigate confounding industry-effects for the following reason. Previously it has been documented that **firms** that expand into related businesses are more successful than firms that expand into unrelated businesses. However, as pointed out in Montgomery (1979) and Christenson and Montgomery (1981), this evidence does not necessarily imply that a strategy of related expansion is more successful than a strategy of unrelated expansion, since related diversifiers tend to have their core businesses in more profitable industries than unrelated diversifiers. Hence the result that related diversifiers are more successful than unrelated diversifiers may be due to an industry-effect: the performance of the core businesses. This problem is mitigated in the present study that examines **individual expansions**.[8]

Second, previous studies that analyze data at the level of the firm use subjectively chosen cut off rates to classify firms in terms of the mode and direction of their expansion strategies (Pitts, 1974, Rumelt, 1974, 1982, Simmonds, 1990). These arbitrary cut off rates are avoided in the present study where we classify individual expansions. An expansion was classified as 'horizontal' if its 3-digit SBI-code (the Dutch equivalent of the SIC-code) was equal to any of the 3-digit codes of the businesses that the firm was engaged in in 1966. It was called 'related' if it differed from these businesses in the third digit but not in the first or in the second digit.[9] [10] In all other cases the expansion was called 'unrelated' unless in principle delivery could take place from the expansion to other activities in the firm or vice versa. In that case the expansion was called 'vertical'.[11]

Previous evaluations of the directions of corporate expansion may also suffer from omitted variables-problems because they do not control for the mode and location of expansions. Simmonds (1990) argues that the direction and mode are interrelated and that any test of the relative success of various directions of expansion that does not control for the mode of expansion is underspecified and may produce biased test results. A similar point can be made from Geringer et al. (1989) who argue that the direction and location of corporate expansions are interrelated. Both studies imply that empirical studies should explicitly control for both the mode and location of expansions in order to avoid potential omitted variables-problems. Our study is the first to perform this analysis.

We end this section with a potential problem of analyzing divestment rates. Above we hypothesized that the benefits from horizontal, related and vertical expansions are relatively large and that managers may learn about these benefits by doing, hence we expect more disappointments from unrelated expansions and hence more divestures of such expansions. This prediction is tested on the basis of data about observed divestures. A potential caveat is that not all divestures are necessarily failures. Firms may acquire another firm, reorganize it, and sell it at a profit. Furthermore, even if expansions are failures they are not necessarily divested. In order to mitigate such problems, we used additional information from the firms' annual report about whether the expansion was a failure or a success.[12] To reflect this additional information, we will speak in the remainder of this paper of 'failure' and 'success' instead of divestures and non-divestures.

DATA

Data were obtained about 14 large non-financial firms in the Netherlands. These firms were selected in the following way. We started with the 20 largest non-financial firms (in terms of sales) listed on the Amsterdam Stock Exchange in 1988. No data were gathered about the 4 largest firms (Royal Dutch, Unilever, Philips, Akzo) since these firms differ significantly from other firms, in terms of the breadth of activities, international scope, size, and so on.

For the remaining firms, we selected all expansions that were reported in the annual reports of these firms between 1966 and 1982. For two firms, Nedlloyd and KLM, the information in the annual reports resulted in low quality data on expansions. These two firms were omitted from the data set. The sales, market value, direction and number of expansions of the remaining 14 firms are presented in table 2.

Insert table 2 about here

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Furthermore, ventures were labeled based on direct information from the annual report about whether they were domestic or foreign, whether they were a start-up or an acquisition, and whether they were a failure or a success. A venture was only included in the data set if all required information could be obtained from the annual report: direction and mode of expansion, domestic or foreign, and failure or success.

EMPIRICAL RESULTS

Tests of the hypotheses in conjunction with the assumption of ex ante rationality.

We first test the hypotheses that horizontal, related and vertical expansions are more frequent and unrelated expansions are less frequent than in a world where firms expand 'randomly', without considering the benefits hypothesized by H_1 - H_3. The **observed** frequencies of horizontal, related and vertical expansions relative to unrelated expansions, p_j, are calculated as $N_j / (N_j + N_u)$, where j is the direction of expansion (horizontal, related or vertical), N_j is the number of observed expansions in direction j and N_u is the number of observed unrelated expansions. These frequencies are calculated from table 2 and presented in column 1 of table 3.

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insert table 3 about here

Column 2 of this table presents the standard deviations associated with the frequencies in column 1, calculated as $\sqrt{p_j(1-p_j) / (N_j+N_u)}$. Column 3 of the table contains the **random** frequencies of the various directions of corporate expansion that are calculated on the basis of Appendix A. Finally, column 4 provides information about the significance of the difference between observed and random frequencies, calculated as column 1 (p_j) minus column 3 (f_j), divided by column 2 (s_j).

The following conclusions follow from table 3. The scores in columns 1 and 3 reveal that the observed numbers of horizontal, related and vertical expansions are all above the numbers of such expansions that would have been expected if firms had expanded at random. Column 4 indicates that all three differences are significant. So the outcomes of this first step of our empirical analysis corroborate the hypotheses H1 - H3 together with the assumption of ex ante rationality: that managers had knowledge about these hypotheses before the expansion took place, and acted accordingly.

Next we test the hypotheses H_4 and H_5. This means, in this first step of our empirical analysis, that we test the prediction that domestic acquisitions and foreign start-ups are more frequent than if firms had expanded 'randomly', without considering the benefits hypothesized by H_4 and H_5. The observed number of expansions in terms of mode and location are calculated from our data set and presented in table 4.

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insert table 4 about here

Table 4 also contains the expected number of such expansions, calculated from the relative marginal frequencies of the contingency table 4, and presented in parentheses. These latter numbers represent the expected expansions if firms had selected the mode and location independent of each other (given the observed distribution over start-ups and acquisitions, and over domestic and foreign expansions). It also follows from table 4 that domestic acquisitions and foreign start-ups are 'overrepresented' by 176 / 146 or 1.21 (21%) and 130 / 101 or 1.29 (29%), respectively. The chi-square of the contingency table 4 is 35.9, which is significant at the 0.001 level. So the hypotheses H_4 and H_5 are corroborated by the data, together with the assumption of ex ante rationality.[13]

Tests of the hypotheses in conjunction with the assumption of ex post rationality.

We start the second step of our empirical analysis with a test of the prediction that horizontal, related and vertical expansions are more successful than unrelated expansions. This prediction is tested in such a way that other dimensions of the firm's expansion strategy (mode, location) are explicitly statistically controlled for. Since the dependent variable in our analysis: success rate, is a dichotomous variable (success/failure), a logit model was specified. The following logit model was estimated:

$$\text{Prob. (Success)} = \frac{1}{1 + e^{-(a_0 + a_1(HOR) + a_2(REL) + a_3(VER) + a_4(MOD) + a_5(LOC))}} \tag{1}$$

where:

Prob. (Success)	=	the probability of success of the venture;
HOR	=	a dummy valued 1 if the venture is horizontal, else 0;
REL	=	a dummy valued 1 if the venture is related, else 0;
VER	=	a dummy valued 1 if the venture is vertical, else 0;
MOD	=	a dummy valued 1 if the venture is a start-up, else 0;
LOC	=	a dummy valued 1 if the venture is domestic, else 0;
$a_0, a_1, a_2, a_3, a_4, a_5$	=	coefficients.

The model was specified in such a way that the coefficients a_1, a_2 and a_3 reflect the increase in success of horizontal, related and vertical ventures, respectively, relative to unrelated ventures. So we expect that a_1, a_2, $a_3 > 0$. As explained earlier, the signs of a_4 and a_5 are an empirical matter.

The model was estimated on all ventures listed in table 1 (N = 498). Maximum likelihood-estimates of the model are presented in table 5. The table also contains the standard errors and the significance levels of the estimated coefficients.[14]

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Table 5 reveals that all three coefficients associated with horizontal, related and vertical ventures are positive and highly significant. Hence the evidence corroborates the hypotheses H_1 - H_3 in conjunction with the assumption of ex post rationality: that managers learned about the hypotheses after the expansion took place and acted accordingly.

Furthermore, the coefficient associated with the mode of expansion is positive but insignificant. Hence like Simmonds, we find no empirical support for his hypothesis that start-ups are more successful than acquisitions. Table 5 reveals no significant difference in success rates of foreign and domestic expansions. However, as explained earlier, this may confound two opposing effects: of monopoly gains and efficiency gains.

The separate hypotheses are tested in the following way. The data set is partitioned in subsets of start-ups (N = 194) and acquisitions (N = 304). The following logit model is estimated on these two subsets:

$$\text{prob. (Success)} = \frac{1}{1 + e^{-(c_{0k} + c_{1k}(HOR) + c_{2k}(REL) + c_{3k}(VER) + c_{4k}(LOC))}} \quad (2)$$

Where k = {1, 2}; 1 = start-up and 2 = acquisition. Consistent with the hypotheses H_4 and H_5 we expect that domestic acquisitions are more successful than foreign acquisitions but that foreign start-ups are more successful than domestic start-ups, hence that $c_{42} > 0$, $c_{41} < 0$. In order to avoid potential omitted variables-problems, the direction of expansion is also modelled. The estimation results from (2) are presented in table 6.

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insert table 6 about here

The estimation results provide weak support for the Coasian efficiency-hypothesis and for the rent-hypothesis. Both coefficients c_{41} and c_{42} have the predicted sign and are almost significant at the 0.10 and the 0.05 level, respectively.

Closer analysis of the coefficients associated with horizontal, related and vertical ventures reveals an interesting difference between start-ups and acquistions. In the case of start-ups, all three coefficients are insignificant at the 0.05 level, although c_{31}, the coefficient associated with vertical expansion, is almost significant. In contrast, in the case of acquisitions all three coefficients associated with the direction of expansions are highly significant. These results are consistent with the interpretation that management has improved upon its ex ante insights (that is, it has learned about the hypothesized benefits) from their experience with acquisitions. No such learning effects are measured in case of start-ups.

SUMMARY AND CONCLUSIONS

This paper provides a new methodology to test for hypothesized differential benefits from various dimensions of corporate strategy: the direction, mode and location of corporate expansion. This methodology is consistent with recent suggestions in Varadarajan and Ramanujam (1989). These authors emphasize that previous studies in this literature analyze data at the level of the firm and are of a cross-sectional nature. Instead, these authors emphasize that there is a need for studies of individual expansion projects and of the experience that management teams have acquired through these projects.

Our main empirical results are as follows. The evidence corroborates that strategies of horizon-tal, related and vertical expansion are more beneficial to firms than a strategy of unrelated expansion. We also found that managers knew about such benefits ex ante, before the expansion took place, and

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learned more about them ex post in case of acquisitions. No such learning effects were measured in case of start-ups. Furthermore, we found support for the hypotheses that foreign start-ups induce relatively large Coasian efficiency gains and that domestic acquisitions induce relatively large monopoly gains. Again our results indicate that managers knew about such gains ex ante and improved their knowledge through experience with such expansions.

1. An alternative interpretation of this random strategy is that firms expand without considering their present portfolio of activities, or that they follow no strategy as far as the composition of the corporate portfolio is concerned.

2. An alternative interpretation, more flattering to most of us, is that managers learned about such benefits from (more recent) MBA training, which they subsequently applied in practice.

3. Rugman (1985) argues that in a world with increasing global competition, monopolistic rent seeking through market closing is largely irrelevant. Alternatively, Casson (1982) has argued that Coasian type theory is largely tautological and has produced few testable hypotheses.

4. Consistent with this view, we predicted earlier that horizontal expansion is more beneficial than unrelated expansion due to economies of scale and/or monopoly gains.

5. Also other hypotheses could be formulated, such as that the monopoly gains from domestic acquisitions are larger than the monopoly gains from domestic start-ups. The latter type of expansion usually implies smaller increases in market share both because increases in sales are more modest (at least initially) and because no competitor is neutralized.

6. Analogous to supra note 5, it can also be derived that foreign start-ups are more beneficial than foreign acquisitions.

7. This illustrates that testable implications can be derived from Coasian-type theory if some empirical content is given to this theory, e.g. by distinguishing between two modes of foreign direct investment: start-ups and acquisitions.

8. In theory, confounding industry-effects can also be mitigated by subtracting the performance of individual firms from the average performance in the industry. This procedure is adopted in Rumelt (1982). Rumelts' method is not without problems. In practice industries are not perfectly homogenous and confounding industry-effects may not be neutralized completely. Moreover, precise data are hard or impossible to obtain. Rumelt obtained data from annual reports, 10K statements, prospectuses, investment analysts' reports, Moody's, and direct inquiries. 'Despite these efforts, the data gathered could scarcely be termed 'hard' or precise. Judgments had to be made, interpolations were required, and more

aggregate definitions of 'industry' had to be used in many cases.' (Rumelt, 1982: 366, 367). The methodology used in this paper is an alternative way of controlling for industry-effects and it is interesting to find out whether it produces similar results as Rumelt (1982). For evidence on the importance of industry-effects, see Schmalensee (1985) and Rumelt (1991).

9. The use of SIC-codes to classify ventures presumably produces a noisier indicator of the type of venture than a classification that involves a team of experts. Hence the likelihood that hypotheses are not corroborated even if they are 'true' seems larger, unless the number of observations in the sample becomes very large. Alternatively, if the hypotheses are corroborated using the noisier but more objective indicator, this empirical result cannot be driven by possible biases from qualitative judgments by a team of experts.

10. An example of the classification of **firms** in terms of direction of expansion is Simmonds (1990) who defines each four-digit SIC code as a unique business. All businesses with the same first two digits of the SIC-code are called related. Firms whose largest group of related businesses (two digit SIC code) accounted for 40 percent or more of total firm sales were called related diversifiers, and those with less than 40 percent were considered unrelated diversifiers. Other cut-off rates are used in Rumelt (1974) and in Pitts (1974). So like our study, studies such as Simmonds use SIC-codes as a classification device. In addition these studies use arbitrary cut-off rates in order to classify firms in terms of their strategy. Such cut-off rates are avoided in the present study. Furthermore, following Pitts (1974) and Lamont and Anderson (1985), Simmonds classifies a firm as externally diversified (that is, where acquisitions are important) if mergers/acquisitions account for 10 percent or more of the change in sales in the firm, else it was called an internally diversified firm (that is, a firm where start-ups are important). Such arbitrary cut-off rates are avoided in the present study where the mode of an expansion is directly obtained from the firm's annual report.

11. The annual reports from which we obtained our data did not provide information about actual transfers of goods and services, so it was evaluated whether such transfers could, in principle, take place. This adds some noise to the analysis, since not all transfers that might take place actually do take place. So the same disclaimer applies as in supra note 10, if we find that the hypothesis that vertical expansions are more successful than unrelated ones is not corroborated.

12. Whether a venture was classified as a success or failure was determined as follows. If a new venture was retained for the rest of the period (until 1988) it was called a success, unless there were indications in the annual report that it was not. If a new venture was divested after problems were reported, it was called a failure. If no problems were reported but the venture was divested within 5 years, it was also called a failure. If it was divested after 5 years and no other information could be obtained, the venture was left out of the analysis.

13. Note, however, that the evidence provides a joint test of the hypotheses. So in theory the evidence can also be explained by the hypotheses suggested in supra note 5 and 6.

14. Significance levels are calculated on the basis of the Wald statistic. For large sample sizes, the test that a coefficient is 0 can be based on this statistic, that has a chi-square distribution.

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This appendix explains how the frequencies of horizontal, related and vertical expansions in case of random strategies (as given in the column labeled f_j in table 3) are calculated.

For each company i one or more three-digit codes are identified: the 3-digit industries in which the company participated in 1966. These are "company i's original activities". Each venture is characterized by its 3-digit code. Then α_i is determined as the number of ventures in the data set having the same 3-digit code as one of company i's original activities. Thus α_i is the number of ventures in the data set that for firm i can be regarded as horizontal. Of course some of these ventures may have been realized by a company other than i. If firm i follows a random strategy, we expect

$$a_i = \frac{\alpha_i}{498} \cdot n_i$$ horizontal expansions, where n_i is the actual number of ventures undertaken by

company i between 1966 and 1982. Analogously β_i is defined as the number of ventures in the data set, that for company i, are identified as related (the first two digits correspond to one of company i's original activities). Finally γ_i is defined as the number of ventures in the sample that could have a relationship as supplier or customer for one of company i's original activities and thus for company i can be regarded as vertical.

Define $$b_i = \frac{\beta_i}{498} \cdot n_i$$ and $$c_i = \frac{\gamma_i}{498} \cdot n_i$$. Then b_i and c_i are the number of related or vertical

expansions one would expect for firm i, if firm i followed a random strategy. Then $A = \sum_i a_i$

$B = \sum_i b_i$ and $C = \sum_i c_i$ are the total number of horizontal, related and vertical expansions one would

expect if all firms follow a random strategy.

Let $D = 498 - A - B - C$. Then $f_A = \dfrac{A}{A+D}$ is the expected frequency of horizontal expansions

in case of random strategies. Similarly $f_B = \dfrac{B}{B+D}$ and $f_C = \dfrac{C}{C+D}$ are the expected frequencies or

related and vertical expansions in case of random strategies. The numbers given in the column labeled f_j in table 3 are f_A, f_B and f_C.

TABLE 1

Possible results from our 2-step methodology

step 2. step 1	Support	No support
Support	**I** corroborated: hyp. + ex ante + ex post rationality	**II** corroborated: hyp. + ex ante rationality
No support	**III** corroborated: hyp. + ex post rationality	**IV** hyp. not corroborated

TABLE 2

Firms in sample

	Sales[a]	Market Value[a]	Hor.	Rel.	Unrel.	Vert.
Ahold	14.638	2.770	9	5	4	3
DSM	10.121	4.620	14	5	21	6
Hoogovens	7.868	2.239	3	16	15	11
Heineken	6.104	4.390	17	3	2	4
DAF	5.201	1.583	3	0	8	11
Buhrmann-T	4.569	2.101	24	18	10	3
Wessanen	3.806	1.479	8	12	1	0
KBB	3.025	809	4	3	4	0
HBG	3.020	610	9	0	3	1
Hunter Dougl.	2.783	1.841	25	15	3	2
Internatio M.	2.649	497	13	4	18	3
KNP	2.510	2.278	10	10	0	4
VNU	2.504	1.421	19	1	8	12
VOC	2.410	666	<u>58</u>	<u>11</u>	<u>17</u>	<u>5</u>
			216	103	114	65

[a] In millions of dutch guilders. The figures are the 1988 sales and market value.

TABLE 3

Observed expansions and expansions expected from 'random' strategies: directions.

	p_j	s_j	f_j	$(p_j-f_j)/s_j$
Horizontal	0.655	0.026	0.074	22.35
Related	0.475	0.034	0.179	8.71
Vertical	0.363	0.036	0.082	7.81

TABLE 4

Observed expansions and expansions expected from 'random' strategies: mode and location.

Location	Domestic	Foreign
Mode		
Start-up	64 (94)	130 (101)
Acquisition	176 (146)	128 (157)

TABLE 5

Maximum likelihood-estimates of the model of equation (1).

Coefficient	a_0	a_1	a_2	a_3	a_4	a_5
Estimate	-0.2252	0.9031	0.9388	1.8227	0.1381	-0.2131
Stand.error	0.2507	0.2462	0.2836	0.3819	0.2055	0.2010
Sign. level.	0.3690	0.0002	0.0009	0.0000	0.5014	0.2890

TABLE 6

Maximum likelihood-estimates of the model of equation (2): Start-ups and acquisitions

Start-ups

Coefficient	c_{01}	c_{11}	c_{21}	c_{31}	c_{41}
Estimate	0.5809	-0.0923	-0.3213	1.2495	-0.5425
Stand. error	0.3819	0.4088	0.4669	0.6399	0.3375
Sign. level	0.1282	0.8213	0.4913	0.0509	0.1080

Acquisitions

Coefficient	c_{02}	c_{12}	c_{22}	c_{32}	c_{42}
Estimate	-0.8258	1.4456	1.6627	1.9802	0.5123
Stand. error	0.3074	0.3232	0.3790	0.4830	0.2695
Sign. level	0.0072	0.0000	0.0000	0.0000	0.0573

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