Master Thesis

For Applied Economics

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Relatedness: An Application to Firm Portfolio Management

Abstract

The concept of "relatedness" between activities is starting to play a more central role in Strategic Management and economics. Moreover, portfolio management is considered to be vital: in assessing new interesting business opportunities, for gaining control over the firm's value chain, to lower firm risk and to exploit idle resources. However, the empirical application of the "relatedness" concept on firm portfolio management on a strategic level stays rather elusive. This article, investigates how "relatedness" between industries influences the composition of industrial portfolios and the mode of industry entry (Merger & Acquisition vs. Joint Venture). Furthermore, it examines how markets value certain kinds of industry entry. In particular, this article uses input-output profiles and human skills to investigate the influence of a certain degree of relatedness on portfolio composition and the mode of industry entry.

The data used in this paper is based on one hundred Dutch firms, listed on the Amsterdam Stock Exchange (AEX). Analyses in this paper clearly show that firms have a strategic tendency to diversify in a related manner, mainly with respect to their current resource base. Although, from a stockholder perspective, vertically related diversifications are valued higher than diversifications which are based on the firm's resource base. Furthermore, investigating the role of relatedness in the firm's decision to enter markets through Merger & Acquisition or by a Joint Venture seems to be far more complex than what the rationale behind previous literature suggests.

* Keywords: Diversification; Relatedness; Market Entry; Portfolio Management; Transaction Cost Economics; Agency Theory; Resource Based View; Mergers & Acquisitions; Joint Ventures

Introduction

A diversification strategy can be considered as a major force in the overall progress of firm performance. Thus, it can considered to be relevant to study the underlying factors of diversification and a firm's strategy in developing and constructing an industrial portfolio. This paper aims to address not only whether the firm's current portfolios are coherent but also how and in what activities firms have diversified over a ten year period, and how these diversification were valued by the market. The results derived from this study could contribute towards new insights on coherency and diversified expansions on the one hand and firm performance – market valuation – on the other hand. This study strongly relies on the motives for a diversification strategy, based on general economic theories such as the resource

based view, transaction costs economics and the agency theory, to explain diversifying behavior.

In the literature, the motives for diversification are considered to be heterogeneous, ranging from hedging risk to exploiting idle resources. Often, however, firms will produce products or services which are in some sense related to the firm's core activity. In this sense it is particularly interesting to take a resource based view of the firm when examining portfolio coherency. To test the degree of portfolio coherency, the following research question is formulated:

Research Question 1: Are firm's industrial portfolios by and large coherent?

After examining whether industrial portfolios of firms are coherent, it is meaningful to estimate the effect of firm-market relatedness on the manner portfolios are constructed. This provides us with the following research question:

Research Question 2: Does the degree of firm-market relatedness influences the mode of industry entry?

From a fairly generic perspective, two main modes of entry can be considered when firms enter an industry through the market, namely: Merger & Acquisition and the establishment of inter-firm collaboration - Joint Ventures.[1] Ultimately, this study investigates the effect of the main economic benefits, attached to the different modes of industry entry, on the market valuation of a firm. Since, the degree to which the market values a particular acquirement of an industry could be a good indication for the development of firm performance in the future. So, the attempt to examine whether or not there is a strong correlation between the stock market response and an announcement of a specific type of diversification can be seen as a research method to measure future firm performance. Thus, for answering the following research question, this research strongly relies on the assumption that markets perfectly incorporate public and private information.

Research Question 3: Does the degree of firm-market relatedness influences the reaction of stockholders to a Merger & Acquisition?

[1] Note: this paper does not address internal development, through which a firm can enter an industry by developing a product by itself, because this method of entry is difficult to measure with the data available.

The remaining sections of this paper are organized as depicted in Introduction Table A1. At first, there is developed a conceptual framework, based on a review of relevant academic literature. In this literature review, section 1 discusses the existence of multi-product firms and the motives for a certain diversification strategy (Hypothesis 1). Section 2 discusses the influence of firm-market relatedness on the mode of industry entry (Hypothesis 2a and Hypothesis 2b). The influence of firm-market relatedness, concerning the primary activity of the acquiring firm and the target activity, on the stock price of the acquiring firm, is discussed in section 3 (Hypothesis 3). Subsequently, section 4 focuses on the research design and the variables and data that are used. In a fairly generic manner, the research design becomes clear by studying the right side of Introduction Table A1. Section 5, focuses on the empirical part of the study, and includes the data analysis and results. The limitations and further research possibilities, which arise from this research, are discussed in section 6. Finally, the conclusions of this article are discussed in section 7. Conclusions in this paper are based on an empirical study of 100 publicly owned Dutch firms and their 519 diversified expansions over a ten year period.

Introduction Table A1: Outline of the Research Paper

Section 1 Diversification Strategy	**Section 5** Analysis from Acquirors Viewpoint
Relatedness an Application to: Portfolio Composition Research Question 1	**Hypothesis 1:** Composition of an Industrial Portfolio Publicly Owned Dutch Firm (**100**)
Section 2 Mode of Industry Entry	
Relatedness an Application to: Industry Entry Research Question 2	**Hypotheses 2a and 2b:** Effect Relatedness on Mode of Entry / Acquirement Acquisitions of Public Firms in Sample (**100**); 01/01/2000 - 31/12/2009
Section 3 Market Valuation and Diversification Strategy	
Relatedness an Application to: Stockholder Valuation Research Question 3	**Hypothesis 3:** Effect Mode of Entry on Firm Performance (Stock Price) Acquisitions of Public Firms in Sample (**100**); 01/01/2000 - 31/12/2009
	Way of Measurement: **Acquiror** — Degree of Relatedness → **Target Activity** *Primary Acitivity Firm* — *Acquired Activity* Stock Price Prior To Announcement — **Time Line of Analysis** — Stock Price After Completion

Theory and Hypotheses

1. Diversification

1.1 The existence of multiproduct firms

In previous studies (Amihud and Lev, 1999; Lane and Canella, 1998; Lubatkin, 1999; Denis, 1999), the firm's choice to diversify is mainly considered to be a strategic decision. Although, the literature makes a clear distinction between portfolio diversification and firm growth and should not considered to be the same, yet in a big part of the literature diversification is recognized as driver for firm growth. In this sense it has been stated that diversification can be seen as a form of growth marketing strategy by which a firm can enter new industries, products, services and / or markets (Williamson, 1975). Based on this, growth can be seen as an incentive for firms to diversify (Panzar and Willig, 1981).

Although, diversification can be considered as a driver for firm growth and as a standalone strategic decision, there are several studies (Morck, Shlefier and Vishny, 1990; Denis, 1999) that have showed that the costs of diversification outweigh the gains. From this, it can be concluded that diversification might be negatively influencing the value of the firm. A primary negative effect of diversification is that the characteristics of firms that do diversify may cause them to be discounted (Campa and Kedia, 2002). This is supported by Berger and Ofek (1995), Servaes (1996) and Lang and Stulz (1994) who show that firms trade at a discount relative to non diversified firms in the same industry. These results seem to be robust for different time spans and regions. So, there is a growing theoretical consensus that the discount on firms with a diversified portfolio implies a destruction of value that may be accounted to diversification, if this strategy does not seem to maximize shareholders value (Campa and Kedia, 2002). The diversification discount may have caused that firms are becoming more focused in their composition of their activities during recent years. According to studies conducted by Bhagut, Shleifer and Vishny (1990), Liebeskind and Opler (1992), Berger and Ofek (1995) and Comment and Jarrel (1995), corporate focus strategies lead to higher market valuation and stock returns. This in contrary to diversifying firms, which may experience a loss of comparative advantage due to not primarily focusing on their core activity anymore (Denis, 1999).

Notwithstanding the arguments made by previous authors for positive (Williamson, 1975; Panzar and Willig, 1981) and negative (Morck, Shleifer and Vishny, 1990; Denis, 1999) effects of a diversification strategy on firm performance, it is important to point out that stock

price movements should not have anything to do with an increase or decrease in firm risk. This because, all gains from firm diversification should have already been achieved by stockholders (Capital Asset Pricing Model). Meaning, that according to the Capital Asset Pricing Model (CAPM), shareholders can decrease their investment risk by applying diversification to their own portfolio (Teece, 1982). Moreover, in a theoretically considered perfect world without taxes and transaction costs, costless information, riskless bargaining and lending and rational utility maximizing agents, we would not expect that diversification will affect firm value. Based on these theoretical assumptions and the argument made by Teece (1982), it is plausible to expect that a diversification strategy would not have an effect on firm performance.

1.2 The Motives for Portfolio Diversification

When reviewing the arguments made in previous studies, it can be concluded that they do not perfectly explain the existence of multi-product firms, since the effect of diversification on firm performance seems to be unclear. Nevertheless, most of the firms follow a dominant growth path from vertical integration to related diversification, while a minority of the firms develops by unrelated diversifying behavior (Galbraith and Kazanjion, 1986). So, the structure of the firm's portfolio is hypothesized to follow a strategy. To explain this strategy it could be valuable to take a closer look at the motives that play a role in a portfolio diversification strategy. The next part of this study will therefore focus on the underlying rationale for firms to follow a diversification strategy. This might contribute towards a better understanding on the existence of diversifying behavior of firms. Possible motives that are influencing a corporate diversification strategy can be segmented in: the agency theory and information asymmetries, the transaction costs economic theory and the resource based view.

1.2.1 Agency Theory and Diversification Strategy

Although, in the literature not considered as primary motives for diversification, a possible explanation for the existence of multi-product firms can be found in the agency theory and information asymmetries. According to Jensen's Free Cash Flow Theory (1986), when a firm generates a positive cash flow, management can either choose to reinvest the cash in the firm or distribute it to the stockholders of the firm. This choice serves as background for the argument of Jensen, namely: "managers, acting in their own self-interest, will cause that managers invest in projects just for the sake of investing to manage a bigger and more diversified firm". An explanation for this is that managers of larger firms tend to have higher

levels of compensations (Smith and Watts, 1992). This is supported by Morck, Schleifer, and Vishny (1990) who hypothesize that as a firm becomes more diversified, it becomes more unique, thereby making managers more valuable and thus able to demand for a higher compensation for managerial activities. However, this managerial behavior will cause an investment in activities that provide a substantial lower return to shareholders, as this type of diversification includes the use of resources to undertake value destroying investment decisions and the draining of resources from better performing activities. Managers will in this case allocate the free cash flow in the wrong way. The empirical findings in the study of Amihud and Lev (1981) are consistent with the managerial motives, causing this inefficient allocation of resources. Amihud and Lev (1981) argued the following: first, manager-controlled firms were found to engage in more conglomerate acquisitions than owner-controlled firms. Second, regardless of the motives for diversification, management owned firms were found to be more diversified than owner-controlled firms (Amihud and Lev, 1981).

In general, portfolio diversification is considered to be an instrument which lowers the level of firm risk (Markowitz, 1959). More specifically, stability of earnings can be achieved through diversification. The advantage of risk reduction exists due to the possibility of diversification of sales in various – secondary – activities, given that the fluctuations of markets are not perfectly positively correlated. Since, firms diversify to spread risk in order to withstand a market contraction and be less vulnerable to market events this incentive to diversify can be considered as a defensive perspective. This is supported by Amihud and Lev (1981), who argued that managers will try to reduce their employment risk through unrelated mergers and diversifications. The empirical findings by Ahimud and Lev (1981) find support in the available evidence on earnings behavior of management controlled firm in comparison to owner controlled firms. Boudreaux (1973) and Holl (1975) found that the variability of earnings of manager controlled firms was considered to be lower than that of owner controlled firms. This is consistent with the agency behavior by managers, to lower firm risk by unrelated diversifying behavior. Specifically, firms without large shareholder blocks are expected to engage in more unrelated acquisitions and show higher levels of diversification and lower returns than firms with large shareholder blocks (Jensen and Meckling, 1976; Eisenhadt, 1989). Since managers are considered to be risk-averse, especially when they perceive that their personal wealth is primarily dependent on the assets of the firm; managers have an incentive to diversify the firm's portfolio in a manner and to a degree that could be harmful to the return of stockholders.

However, this kind of corporate diversification strategy is inexplicable within the context of the Capital Assets Pricing Model (CAPM). The CAPM statement, used by Teece (1982), pointed out that diversification does not need to reduce stockholder risk per se, since all gains from this kind of amalgamation should have already been achieved by stockholders.

Another and final explanation for the occurrence of corporate diversification in relation to the agency theory can be found in the agency costs of debt. According to Lewellen (1971), there are significant tax advantages to debt financing, but there are costs involved as well. By increasing the debt capacity, a firm's management is able to take on riskier projects that will benefit stockholders, while taking more risk also implies higher chances that debt holders will default. Managers will in this case react by diversifying the firm even further in order to increase the firm's debt capacity, as they have a preference to increase the wealth of stockholders (Brealey and Myers, 1999). This may cause conflicts between bondholders and stockholders. However, debt financing can also have a positive effect on firm performance, as can be derived from the theory of Lewellen (1971), who suggested that diversified firms can sustain higher levels of debt because diversification is likely to reduce income variability. If the tax shield of debt increases firm value, this argument predicts that diversified firms are more valuable than firms operating in a single industry (Servaes, 1996).

1.2.2. Information Asymmetries and Diversification Strategy

Information asymmetries – differences in the information sets between managers and outside investors - could cause firms to develop their own capital markets, which could be referred to as economies of internal capital markets (Stein, 1997; Fluck and Lynch, 1999). In this case, market failure exists in the providing of capital by outside investors. This is among others caused by managers, who are unable to signal the value of an activity or investment policy, causing that firms operate under capital constraints. According to Berle and Means (1932) this is given in by transaction difficulties which are the result of informational hazards and opportunism, caused by the segregation of ownership and control. Thus, the ownership structure could cause difficulties in assessing firm performance as managers have the opportunity to behave opportunistically, by maximizing their own utility rather than those of stockholders (Marris, 1964; Williamson, 1975). Thus, information asymmetries provide scope for the agency problem to arise. Concluding, if external financing does not work, firms may create an internal one to resolve informational problems. In this sense firms are more able to exert control over their capital investment projects. By creating these internal markets, firms

might be able to exert activities with a positive net present value (Williamson 1970). However, a downside is that firms need to use internal audits to indentify opportunistic actions by different divisions (Williamson, 1975).

1.2.3 Transaction costs and Diversification Strategy

Transactions costs are the negotiating, monitoring and enforcement costs that firms need to undergo, to allow an exchange or a transaction between two parties to take place (Jones and Hill, 1988). The sources of these costs are transaction difficulties that may be present in the exchange process (Williamson and Klein, 1975; Crawford and Alchian, 1978). In the absence of market imperfections, there would be no clear motive for firms to conduct diversification and deploy activities, different from their primary activity. Since, according to Teece (1980): "in a zero transaction cost world, scope economies can be captured using market contracts to share the services of input" (Teece, 1980, p. 30). Although, because of market imperfections, firms are incentified to diversify into other activities.

If transaction difficulties arise, firms have the possibility to write and enforce a contract on the market or to internalize the other transaction party (Arrow, 1974). This explains why some transactions are conducted on the market, while others inside the firm (Coase, 1937). The firm's preference for an organizational mode depends on the economic gains and bureaucratic costs that are involved to achieve an organizational mode (Gibbons, 2005).[2] For firms to acquire and thus internalize a certain activity, transaction costs must be involved. This because, transaction costs allow for economic benefits to be achieved through internalization, and so the integration of economic activities (Jones and Hill, 1988). Thus, the existence of transaction costs allow for firms to diversify and internalize activities by adding these to their portfolio. By internalizing an activity, a firm is able to exert more control over its inputs and outputs, since the target and acquiring unit can be seen as one entity. This could give firms the incentive to vertically integrate activities within the value chain. By using the value chain analysis, it is possible to provide more understanding in the dynamics of inter connectedness within a productive sector, by looking at in, - and output flows between industries (Kaplinsky and Morris, 2009). "Industries are considered to be vertically related if one can employ the other's products or services as input for own production or supply output as the other's input"

[2] Leibowitz and Tollison (1980), argued that: "bureaucratic costs that are attached to internalizing an activity can be qualified as the loss of control over divisions, this may allow divisions to develop their own goals and to exploit their own preferences rather than those of the firm".

(Fan and Lang, 2000, p. 630). Furthermore, "firms may use vertical integration to mitigate the costs of market transactions" (Fan and Lang, 2000, p. 631). In this way, firms are less dependent on supply chain partners. The dependency on an external supply chain diminishes, as firms are more flexible in the event of a holdup (Fan and Lang, 2000).

1.2.4 Idle Resources and Diversification Strategy

A final main motive for firms to diversify is the firm's focus on an optimal allocation of excess resources which are left idle. A firm often, and according to Penrose (1959), always does have excess resources because of resource indivisibilities and learning. As Penrose (1959) mentioned: "shared factors may be imperfectly divisible, so that the manufacture of a subset of goods leaves excess capabilities in some stages of production, or some human or physical capital may be public input which, when purchased for use in one production process, is then freely available to another" (Willig, 1979, p. 346). If these idle resources are optimally used for other final products this could be beneficial to a firm (Willig, 1978). This motive for diversification strongly stems from the resource based view theory. The resource based view is best explained by a text in an article of Learned (1969), who noted that: "the capability of an organization is its demonstrated and potential ability to accomplish against the opposition of competition whatever it set out to do. Every organization has actual and potential strengths and weaknesses; it is important to try to determine what they are and to distinguish one from the other" (Andrews, 1971, p. 52). Thus, what a firm is able to do is not just dependent on opportunities in the market; it is also dependent on the resource base of a firm (Teece, 1997). So, considering the resource based view, the type of diversification strongly depends on the resource specificity within a particular industry (Montgomery and Wernerfelt, 1988; Williamson, 1975). "If a firm possesses resources which are rather flexible, it would have an option of either a more or less related method of diversification" (Chatterjee, 1991, p. 2).[3] This related diversification strategy could drive profits and could positively influence the firm's market valuation, by the achievement of economies of scope (Teece, 1980). Economies of scope are "arising from inputs that are shared, or utilized jointly with complete congestion" (Jones and Hill, 1988, p. 3). In the literature the concept of economies of scope is often

[3] If a firm is using resources which are particular applicable to a specific end product, this resource is clearly not suitable for the use of diversification. However, most resources can be used for the production of more than one product. If a firm owns resources which are fairly product specific, Chatterjee (1991) is calling this particular characteristic of resources 'flexibility'. "If a firm owns resources which are very specific, which implies that the firm is fairly inflexible, then such firm would be constrained in its diversification strategy. The latter means that the firm will be constrained to diversify in a related manner to allocate resources in an optimal way" (Chatterjee, 1991, p. 2).

linked and associated to the achievement of synergistic gains. To achieve synergy, activities have to group to utilize common channels of distribution or to exchange marketing and technological information (Panzar and Willig, 1977, 1981).

Resources of the Firm

In principle, "any of the firm's resources can be a source of relatedness if it can be used in more than one industry" (Neffke and Henning, 2009, p. 2). A particular aspect of the effect of relatedness on portfolio construction and diversifying behavior of firms is the degree to which identical human capital can be employed in multiple industries (Porter, 1987). Porter's (1987) statement is important when considering diversification in relation to the resource based view, as it gives an interpretation on relatedness that builds upon the concepts of human skills. Porter (1987) argues that the main value of relatedness lies in the sharing of skills among different levels of the business. This emphasis on the sharing of human skill implies that an important aspect of relatedness between activities is the degree to which a certain activity can be employed in different industries. This view is supported by different theories regarding the resource, - and knowledge based view of the firm. "Accordingly, human skills and knowledge can be considered as a key resource for the firm" (Neffke and Heninng, 2009, p. 5). Ultimately, workers can be seen as an important asset because they are the carriers of the firm's know-how. Some of these capabilities are fairly generic while other human skills are very specific to a task. Thereby, human skills can be specific on different aggregation levels, one can think about industry, firm and job level. Labor movements that occur between industries, which are unrelated, normally lead to a large wage loss for the individual. This result is assumed to be a consequence of a decrease in the productivity of the employee, this because a part of the specific human skills are destroyed by employing the worker in a different task (Poletaev and Robinson, 2008).

1.3 Relatedness and Diversification

As can be derived from the former part of this paper, firms have clear motives to exert a particular corporate diversification strategy. An important consequence of these motives, is that firms over time add activities to their portfolio that are in some sense related to existing activities which are undertaken by the firm (Teece, 1994). Furthermore, Teece (1994) argues that, new activities very often, though certainly not always, utilize capabilities common with

existing product-market combinations.[4] This is in line with the claims of Chatterjee and Wernerfelt (1991), Montgomery and Hariharan (1991) and Silverman (1999), who state that diversification is most likely to occur along a related path. Furthermore, this is supported by Neffke and Henning (2009), who state that firms often diversify into industries that are related to their core activity. Thus, new activities are to some extent similar to existing technologies and market capabilities. Based on this, firms are considered to have a coherent portfolio by the extent activities, which are included in the portfolio, allow for economies to their joint operation and / or ownership (Teece, 1994). In summary, firms follow a sequence which begins as a single product firm and evolves towards a multiproduct portfolio.

Although, extensively discussed, the focus of this paper is not primarily on why firms diversify, but on the role of relatedness in how firms diversify. This does not imply that transaction costs economies, scope economies and the agency theory should be neglected when studying the role of relatedness in the diversification process. Since, these motives for diversification are likely to influence the degree of relatedness within an industrial portfolio. The relation between a corporate diversification strategy, deducted from the three paradigms, and the role of relatedness in a particular strategy is clarified in Table 1.

Table 1: Main Economic Benefits of Diversification Strategies

Corporate Strategy	**Main Economic Benefit**	***Economic Theory***
Related Diversification	Economies of Scope (Synergy)	*Resource Based View*
	Use of idle resources	
Unrelated Diversification	Economies of Internal Capital Markets	*Agency Theory*
	Hedging of Firm Risk	
Vertical Integration	Economics of Integration	*Transaction Cost Economics*

Diversification was originally classified as either related or unrelated by Rumelt (1974); most recent literature considers the degree of relatedness as a continuous variable. This approach is adopted by Montgomery (1982), Montgomery et al. (1988) and Caves et al. (1980). This paper will therefore follow the latter approach and considers the degree of relatedness to be a continuous variable which can vary from and divided in: 1.) related diversification, which

4 In order to understand the phenomenon of firms diversifying in a related manner and thus about the degree of coherency of an industrial portfolio, it is important to state that coherence is something different from specialization. Specialization refers to the performance of a particular task in a particular setting however, having a coherent portfolio does not necessarily need to imply that firms are specialized. Specialization is a special case of coherence when the coherence is restricted to a single product line; this paper is in line with Teece (1994), defining coherence in a multi-product sense.

stems from the resource based view, 2.) unrelated diversification, which can be brought into relation with the agency theory, and finally: 3.) vertical integration which can be mainly derived from transaction cost economics.

Hypothesis 1: The human skill and value chain relatedness of industry (i) to the core activity positively influence the probability that i will be a member of the portfolio.

2. Industry Entry

2.1 Modes of Industry Entry

A firm that is willing to expand the scope of its current business and realize growth is able to achieve this through internal development and / or through the market. This is the fundament for the decision which activities are acquired on the market "buy" and which activities are added to the industrial portfolio through internal development "make". A firm that is expanding its current scope by transactions undertaken on the market has the possibility to undertake these expansions alone or share ownership with strategic partners. From a fairly broad perspective, the ways a firm can expand through the market, is by Merger & Acquisition or by setting up a Joint Venture. In this sense a Joint Venture can considered to be a manner for firms to develop and exploit new product market combinations by the pooling of similar and complementary knowledge with cooperation of other parties (Hennart, 1988).

Ultimately, it is important to point out that most recent studies have failed to provide empirical support for the effect of industry relatedness on the industry choice of entry. For instance: Pennings et al. (1994), found no significant correlation between the entry mode and the measures of relatedness, unrelatedness and vertical relatedness. This might be due to the degree of relatedness, which does not influence the costs of entry via the market, as the price of an acquisition is mainly determined by market conditions and synergistically gains. This, contrary to a firm entering a market through internal development, as the firm than has the possibility to leverage its resource base to overcome entry barriers that occur when a firm adds a new activity to its portfolio.

2.2 Mergers & Acquisitions vs. Joint Ventures

In a study of Coves and Mehra (1986), it is argued that Mergers & Acquisitions and Joint Ventures serve as substitutes, rather as complementariness for the mode of entry if controlled for other variables. This statement is supported by findings of Pennings et al. (1994) who found evidence for a decline of Mergers & Acquisitions and a rise of the strategic use of Joint

Ventures in the 1990's. In any given context, the two modes of entry are likely to differ and ultimately, the success of industry entry may perhaps be dependent on the choice of entry mode (Lee and Lieberman, 2009, p. 1). Although, considered to be substitutes, in existing literature the co-existence of both modes of entry is mainly explained by information asymmetries, governance structure and the sharing of knowledge / resources.

2.2.1 Information Asymmetries

According to Balakrishnan and Koza (1991, 1993), Joint Ventures are the preferred entry mode when the acquirers do not know the value of the assets desired. A Joint Venture is an efficient tool to cut back informational costs because it makes it possible to gather additional information on the value of the target's assets, and to withdraw from the alliance at relatively low costs. Thus, Joint Ventures should be preferred over Merger & Acquisition when firms have little knowledge of each other's business, i.e. when they are in different industries (Balakrishnan and Koza, 1991). However, according to Hennart (1988), firms being in the same industry should not be of any influence on the way firms choose to combine or allocate their assets to other industries. Since, partners in scale Joint Ventures, that are aiming to maximize profits and shareholder value, often participate in the same industry (Hennart, 1988).

2.2.2 Governance Structure

A difference between Mergers & Acquisitions and Joint Ventures, regarding the governance structure, is the allocation of ownership. An important motive for firms to share ownership is due to the costs of divesting or managing unrelated activities. If these costs are high, a Joint Venture is likely to be the preferred mode of entry. Notwithstanding, this cost advantage, that is arising through the contribution of multiple partners, a Joint Venture is not without difficulties. This is caused by governance structures of Joint Ventures, which entail hybrid forms of structures, staffing and accounting, that are dependent on the build up and the willingness of parties to invest in relationship specific assets (Powell, 1990). Thus, if the benefits of lower divesting and / or management costs of unrelated activities are outweighing the investments in relationship specific assets, it is likely that a Joint Venture will be preferred over Merger & Acquisition.

2.2.3 Resource Based View

A Joint Venture can be seen as an instrument for firms to transfer tacit knowledge and to expand the firm's current resource base (Kogut, 1988). Derived from this, the existence of a Joint Venture is considered to be driven by the motive of one firm to acquire the others knowhow and expand its own resource base. On the other hand a firm may be willing to maintain a capability while benefiting from the other firm's resource base or cost advantage (Kogut, 1988). Hennart (1988) argued that: Joint Ventures are often established to combine knowledge and to extent the firm's resource base. An important motive for the use of a Joint Venture is that a firm will be reluctant to use Merger & Acquisition as an entry mode when the desired resources within the target firm are hard to extract from the other resources of the target firm (Hennart, 1988). If the firm decides to acquire the whole firm it makes it difficult for the firm to divest afterwards. By contrast, a Joint Venture allows the firm to acquire the desired resources without having to manage the complete target firm. Hence, the fact that the target firm's desired assets are linked to non-desired assets, makes Merger & Acquisition costly, while it does not cause problems for a Joint Venture. This because: "the value extracted from the complete resource base counts as a contribution to the Joint Venture, yet it is still available for the partners other businesses" (Hennart and Reddy, 1997, p. 2). Joint Ventures may therefore be preferred when the desired resources are indivisible from the target firm's resource base. Mergers & Acquisitions, on the other hand, will be chosen if the acquiring activity is conducted within a small firm or when the activity is part of a division which belongs to a bigger incumbent firm (Kay, Robe and Zagnolli, 1987).

Hypothesis 2a: Relatedness between the acquired industry (i) and the firm's core activity (c), has an influence on the strategic choice that Mergers and Acquisition will arise as deal mode.

Hypothesis 2b: Relatedness between the acquired industry (i) and the firm's core activity (c), has an influence on the strategic choice that a Joint Venture will arise as deal mode.

3. Market Valuation and Diversification Strategy

This paper discussed several theoretical paradigms that provide motives for a corporate diversification strategy that is to some extent related to a current portfolio composition. Firms adopt a diversification strategy, when the benefits of diversification outweigh the costs and stay focused when they do not. Thus, in essence, if the benefits of a corporate diversification strategy never outweigh the costs, firms will continue to be a single-product firm. Nonetheless, according to previous authors, a diversification strategy can have multiple effects on the

market valuation of a firm. The next part of this article will therefore focus on the outcome of a certain diversification strategy on the market value of a firm.

3.1 Related Diversification Strategy

According to Pennings et al. (1994), expansions are more robust when related to the firm's core skills. This could be supported by the fact that expansions will be more certain and connected to the firm's current resource and knowledge base if they involve related diversification. This is also supported by Bettis and Hall (1982), Hoskisson et al. (1990), Montgomery (1985), Palepu (1985), Rumelt (1974) and Varadarajan and Ramanujam (1987), who argued that diversifications generate higher market valuation, if the acquired activities are closely attached to the firm's core competencies. So, based on previous literature, the conclusion can be drawn that expansions, independent of the method of entry, can considered to be more successful if the activities are similar and related to what a firm has been doing before.

3.2 Unrelated Diversification Strategy

Porter (1987), has addressed the question of related diversification and performance on the firm level, and argued that firms divested very large proportions of corporate acquisitions involving industries, unrelated to their own. The implication is that acquired firms and their markets, products, technologies and other specialized resources are difficult to integrate with an acquirer whose own skill diverges from those of the acquisition, or to capture potential synergy. Furthermore, Jones and Hill (1988) suggested that the cost of administrating related acquisitions are significantly higher than for unrelated acquisitions. Such costs trigger disinvestments and give firms an incentive to diversify in an unrelated manner, although considered to be less successful (Ravascraft and Scherer, 1991).

3.3 Vertical Related Diversification Strategy

According to Rumelt (1974), vertical integration can be considered as more debatable, regarding market valuation. Rumelt (1974) found that vertical integrated firms were amongst the worst performers. However, in a study of 1982, Rumelt found that inferior performance might be industry specific. Despite the results found by Rumelt (1974), there can still be expected that vertical expansions might be more successful than unrelated expansions for several reasons. At first, managers tend to be more familiar with supplier and customer industries in vertical expansions (Pennings, Barkema and Douma, 1994). Second, the

development of activities may require specific investments in several stages of the development and production of an activity. Synchronization of such investment decisions may be easier to achieve within one firm or with well know partners. When transactions depend on specific investments, vertical integration can be considered as successful (Williamson, 1985).

Hypothesis 3: Merger & Acquisition of activities with a higher degree of relatedness to the firm's core activity (c), can be associated with an increase in the stock price (s) of the acquiring firm

4. Research Design and Data

The first part of the analysis, which examines whether firm portfolios are by and large coherent, primarily focuses on the portfolio-level. The dataset, to examine portfolio coherency, consists of one hundred publicly owned Dutch firms with all possible secondary activities in combination with the primary activity on a NACE 1.1 four digit level.[5] Furthermore, this database includes information on financial, - and portfolio characteristics. It is important to point out that both: information on financial ratios and portfolio are observed ex-post.[6]

For the construction of this database, this study primarily makes use of the Reach database. This modular database contains information regarding Dutch companies (legal entities) and covers topics such as company characteristics, activity data and financial data. Reach gathers information on all 2.5 million firms (complete population) in the Netherlands. To obtain a workable sample from the population of firms, the following criteria were used: (1) active economic status with an address in the Netherlands (2.135.286 firms left), (2) available NACE 1.1 Codes, representing the industries in which the firm is active (2.130.490 firms left) and (3) the firm is publicly owned and listed on a Dutch Stock Exchange (100 firms left).[7] Due to the fact that Reach often depicts primary activities - and to a smaller degree secondary activities - on a two digit NACE 1.1 code level, this study also makes use of the Zephyr Database. The Zephyr Database contains information on Venture Capital, Mergers &

[5] In total, 508 possible industries can be defined on a NACE 1.1 four digit level. This implies that every firm includes 508 rows (activities) which can be present in the firm portfolio. The fact that the dataset contains one hundred firms, which includes 508 rows to depict a firm's portfolio composition, implies that the dataset includes a total of 50.800 rows. Note: only 507 activities might be viable as secondary activity since one activity, on a NACE 1.1 four digit level, is already defined as the firm's primary activity. Based on the relatedness between the secondary activities which are present in the industry portfolio and the firm's primary activity, it is possible to make a judgement about the level of portfolio coherency.

[6] The fact that this information is observed ex-post refers to the fact that this is information over the base year 2009.

[7] Due to different laws and regulations there is decided to exclude firms, which employ their primary activity in the financial sector, from the sample.

Acquisitions, IPO's and Joint Ventures on a global scale. Although, the Zephyr Database is closely related to the Reach Database, Zephyr displays firm industrial portfolio information in a more accurate manner. This implies that information regarding the firm's primary, and to a smaller degree the secondary activities, is available in this dataset on a NACE 1.1 code at a four digit level. By combining this information with the information extracted from the Reach Database, this study was able to display the firm's industrial portfolios on a NACE 1.1 code at a four digit level in a correct manner. The final database of which this study makes use is the Thomson One Banker database. This database is used to extract information on general firm characteristics (financial ratios). The Thomson One Banker database primarily focuses on financial information of publicly owned firms on a global scale. All variables extracted from the databases are in unit values over the end of the year 2009.

In addition, the second part of this study focuses on the transactions which are conducted by the one hundred firms in the first dataset. The second dataset enables this research to examine whether firm-market relatedness has an effect on the mode of industry entry and stock market reactions. To collect information on market transactions, this study uses the Zephyr Database. The dataset used in this study consists of 519 transactions which can be divided into 42 Joint Ventures, 104 Partial Acquisitions and 373 Full Acquisitions.[8] Besides, additional information such as: announcement date of transactions, completion date of transaction and stock price movements, are extracted from the Zephyr Database. Based on the information in this dataset, there can be concluded that 24 out of the 100 publicly owned Dutch firms have not undertaken any transactions during the period 2000 till 2010.

4.1 Explanatory Variables

4.1.1 Measures of Relatedness

Objectively setting the threshold for diversification and measuring relatedness on a large heterogeneous sample of firms remains difficult. Nevertheless, existing measures of relatedness typically rely on the NACE industry classification system. The relatedness measure which is solely based on the industry classification system is omitted from this study. In this method researchers classify two businesses as unrelated if they do not share the same

[8] The initial dataset consisted of 769 transactions which were conducted on the market by the 100 publicly owned Dutch Firms. However, not all of these markets transactions can be considered as diversified acquisitions. This, because in 250 cases, the target activity was identical to the firm's primary activity which was involved in the transaction on a NACE 1.1 four digit level. These 250 cases were dropped from the dataset, which makes that the dataset *before* modifications (for example: adjustments made because of non-normality) includes 519 market transactions.

two, three or four digit NACE code and vice versa. The NACE classification based measure is unsatisfactory in several ways, namely: the method does not reveal relatedness types, the NACE codes are discrete and do not measure the degree of relatedness and finally they are subject to classification errors. Two other measures, which are differentiated by business studies and by which firms can have a coherent portfolio are considered in this study. Those are: the human skill relatedness measure and the value chain based relatedness measure.

The degree of relatedness (R_{xy}) is defined by the distance between the market entered (y) and the market in which the acquiring firm currently operates its *primary activity* (x). This actual R_{xy} is captured by the proximity between the activities. The higher the value of R_{xy} the better the match is in resources and / or input-output profiles between the two industries.

Human Skill Relatedness (RSR_4d)

The first way by which relatedness is reflected in this study, is by means of human skill relatedness (RSR_4d). This measure for relatedness is constructed and made available by Neffke and Henning (2009). In this sense, this paper adopts the study of Neffke and Henning (2009) in which the focus lies on people and the alternative usage of their skills as the resource to determine relatedness among industries. The relatedness measure has been build upon the fact in which skilled people change jobs between different industries. Neffke and Henning (2009) refer to this measure as: "the revealed ability of skilled employees to move between industries". The human skill relatedness measure, constructed by Neffke and Henning (2009), is based on the Swedish economy and uses NACE 1.1 four digit codes; however, codes and industry names are compatible for the Dutch economy. The relatedness values between industries are based on total labor flows between two industries, excluding managers and low paid employees. These are excluded due to their fairly generic capabilities, which are more easily applicable in other industries. Subsequently, the relatedness between two industries is defined by the extent to which labor flows are in excess of predicted labor flows. The Skill Relatedness variable is calculated as a ratio between the flow of employees that move between industry i and j , and the predictor of this labor flow based on a number of industry variables (Neffke and Henning, 2009). A more detailed explanation on the construction of this measure can be found in Neffke and Henning (2009).

Vertical Relatedness (VR_2d)

The second manner by which relatedness is measured in this study is by value chain relatedness (VR_2d). This study builds upon the method used by Fan and Lang (2000) and the work of Lemelin (1982). To develop a pair of inter-industry relatedness coefficients, vertical relatedness is captured by the amount of input transfers between industries. To construct the vertical relatedness measure, the output of industry j to i (t_{ji}) is divided by the total output of industry j, to get a_{ji}, which represents the amount of industry j's output to produce an amount of industry i's output. Vice versa, t_{ij} is divided by industry j's total input to get a_{ij}. In order to obtain the vertical relatedness coefficient of industries i and j, an average of the two input-output requirement coefficients is constructed. To obtain this vertical relatedness the following formula is used: $A_{ij} = \frac{1}{2}(a_{ji} + a_{ij})$. This can be interpreted as a proxy for the opportunity for vertical integration between industries i and j (Fan and Lang, 2000). The value chain relatedness measure is based on a NACE 1.1 two digit input-output table concerning the Dutch economy in the year 2007.

4.2 Dependent Variables

Presence of Activity in Industrial Portfolio (Presence)

In order to test the relatedness of an industry (i) to the core activity on the probability that i will be a member of the portfolio of the firm, the variable (Presence) is used as dependent variable. This dependent variable will be used in a logistic regression and can be characterized as a binary variable which will take on a value of one if an industry is present, and zero if the activity is absent from the industrial portfolio. There are 507 possible combinations between the firm's primary activity and potential secondary activities.[9]

Mode of Industry Entry (EntryMode)

To examine whether a firm is entering an industry through Merger & Acquisition or by the use of a Joint Venture, this dependent variable is defined as one in cases of entry via Merger & Acquisition, and zero when the entry mode is a Joint Venture.

[9] Although, there are 507 possible combinations between a firm's primary,- and secondary activity on a NACE 1.1 four digit level, Human Skill Relatedness is only defined for about 400 industries.

Stock Price Movement (PE)

The firm's stock price movements, which serve as a proxy for market expectations and so as a measure for future firm performance, is constructed with the following formula: (Stock Price on Completion Date of Transaction – Stock Price on Announcement Date of Transaction) / Stock Price on Announcement Date of Transaction. Using this formula, implies that this variable is depicted as a percentage.[10]

4.3 Control Variables

Firm Characteristics

Firm Risk (βeta)

While the resources of a firm can provide a systematic influence on the type of markets entered, there are also other factors which typically influence the underlying rationale in the firm's decision to enter markets. One verification problem of this paper lies with an important theoretical reasoning that managers may take decisions to benefit their own utility instead of decisions which are beneficial for the firm's stockholders. If managers are trying to increase their own utility rather than increase the benefits of the firm, they are likely to do this by empire building and the reduction of personal risk (Chatterjee, 1991). According to Hill and Snell (1988): "risk averse managers, of firms that in are in high risk / high return markets, may choose unrelated diversification while it would be in the best interest for the stockholders to diversify in a related fashion or not at all" (Chatterjee, 1991, p. 4). Since, the likelihood of agency behavior will rise when the risk of bankruptcy and so the personal loss of managers is high (Amihud and Lev, 1981), this paper controls for agency costs by using the level of firm risk, depicted by the stock's βeta.[11]

[10] Due to major differences between the announcement and completion date, which dilutes the effect of the transaction on the stock price movement, 103 observations were dropped from the dataset. Due to this modification, the difference between the announcement and completion date was narrowed down to a maximum interval of ten days. Furthermore, another 96 observations were dropped due to missing values for the stock price movement.

[11] The βeta, which depicts the firm's risk, can be interpreted as the firm βeta. This firm βeta is the firm's risk compared to the risk of the overall market (the index on which the firm is listed). Note: for the firms in this sample, the βeta represents the firm's risk compared to the risk of the Amsterdam Stock Exchange. For instance: if a firm has a βeta of 1.5, then it is said to be 1.5 times as risky as the overall market. The firm's βeta is usually depicted in the following Capital Assets Pricing Model formula: $r = rf + \beta(Rm - rf)$. Where r is the stock's return, rf the risk free rate and Rm depicts the return on the market.

Firm Age (LNAge and Age)

The control variable firm age (LNAge and Age) controls for the experience a firm has, it is assumed that this might have a positive influence on the performance of the firm. Moreover, one can think of more brand awareness and exposure when a firm matures.

Primary Industry (PA_1d)

Firms in certain industries might be more profitable or more capable to diversify their risk than firms in other industries. To control for this influence, this study uses a variable (PA_1d) which reflects the primary activity of a firm on a one digit level. Nine possible industries are introduced as a control variable. The target industry at a NACE 1.1 one digit level is introduced to control for industry characteristics and for certain expectations by markets, concerning particular industries.

Firm Size (LNToAs)

According to Chatterjee (1991): "the resource based view approach does not allow to make a prediction about the direction of association between size and the type of diversification" (Chatterjee, 1991, p. 5). Nevertheless, we may expect that large firms have more resources available for diversification, which could cause managers to allocate resources in an inefficient manner. In this sense a large firm size may be associated with unrelated diversification. To control for the size of the firm, this paper uses the total assets (LNToAs) of the firm.

Secondary Activities (Activities)

In order to distinguish between the extent and the coherence of diversification, this study uses a categorized control variable (Activities). The level of diversification, which is depicted by this variable, is only used in analyzing the descriptive statistics. Since, the vast majority of firms have a portfolio that consists of four secondary activities or less, it is decided to construct a categorical variable. By this, firm portfolios, that consists of five activities or more are all represented in category six.[12] This makes analyzing the descriptive statistics more accessible.

[12] In Appendix A1, a more detailed description can be found on the number of secondary activities, which are assigned to the fairly equally different categories.

Capital Intensity (CPA)

According to Barton (1988) and Bettis (1981) there exists a relationship between capital intensity of firms and related diversification. As Porter (1976) already argued, capital intensity may act as a barrier for industry to enter and exit industries because a high capital intensity could act as a form of industry specific assets. This encourages the preservation in an industry, which makes it more difficult for capital intensive firms to add unrelated activities to their portfolio. This paper will control for this effect by including the level of capital intensity, which reveals the capital intensity of the acquiring firm.

Financial Resources Measures (ROA, ToAs, Age)

In previous studies: "several measures to capture the strength of the firm's financial resources are used: profitability, market-to-book value, firm size, and firm age" (Lieberman and Lee, 2009, p. 11). Former studies have also argued that firms with more financial resources are more likely to develop a product-market combination in-house and have a larger probability of declining to enter an industry by conducting a transaction on the market (Chatterjee, 1990; Chatterjee and Singh, 1999). However, in Lieberman and Lee (2009), it is argued that: "the measure for internal financial resources used in these studies, namely the ratio of long term debt to the market value, is shown either to reveal no significant correlation with entry mode (Hennart and Park, 1993) or predict internal development in some of the cases (Chatterjee, 1990) but acquisitions in others (Chatterjee and Singh, 1999)" (Lieberman and Lee, 2009, p. 11). Therefore in this paper, the method used in Lieberman and Lee (2009) is adopted, to use a combination of variables that are likely to show some correlation with the extent to which financial resources are present; profitability – measured by Return on Assets (ROA), firm size (Total Assets) and firm age (the number of years since the firm is established).

Transaction Characteristics

Year of Deal Completion (YearCom)

For examining the effects mentioned in hypotheses two and three, the year in which the deal is completed is used as a control variable. In hypothesis two the variable is mainly used to control for market trends. This arises from the statement by Pennings et al. (1994) who found evidence for the fact that Mergers & Acquisitions and Joint Ventures are substitutes, as mentioned earlier on in this paper. This could cause either a rise or decline of entry modes for different time spans. For the assessment of hypothesis three, the year of deal completion is

mainly used to control for market sentiments. However, this variable will only be used for analyzing the descriptive statistics.

Mode of Industry Entry (EntryMode)

Next to, the adoption of the mode of industry entry as a dependent variable, this variable is also used as a control variable. To control for the mode of industry entry, in the examination of the stock price reaction to the industry entry, this variable is defined as one in cases of entry via Merger & Acquisition, and zero if a Joint Venture occurs.

5. Data Analysis and Results

5.1 Summary Statistics

The summary statistics for the variables used in the regression analyses are depicted in Summary Statistics Tables A1, A2, B1 and B2.[13] In Summary Statistics Table A1, the number of observations, the mean and the standard deviation of the variables are depicted.[14] From Summary Statistics Table A1 it can be derived that there are no missing values for the control variables. However, the adjusted Human Skill Relatedness variable is only present for 35.346 cases, while the Vertical Relatedness variable includes 50.700 observations.[15]

Summary Statistics Table A1: Summary Statistics Dataset One

		N	Mean	SD
1	**LN Total Assets**	50.800	6.4803	2.3704
2	**LN Firm Age**	50.800	3.5999	.08770
3	**Adj. Return on Assets**	50.800	0.7963	1.1105
4	**Adj. Capital Percentage Assets**	50.800	0.9659	0.0113
5	**Stock βeta**	50.800	0.7408	0.3801
6	**Adj. Human Skill Relatedness**	35.346	-0.6498	0.6009
7	**Vertical Relatedness**	50.700	0.0301	0.0656

As expected, Summary Statistics Table A2 shows that the relatedness measures are to some extent positively correlated with each other. The correlation between the Adjusted Human

[13] Appendix Tables A1 and A2 contain more comprehensive information on the variables that are used in the regression analyses and descriptive statistics. Furthermore, the information in this appendix provides information on adjustments made based on non-normality. Thereby, this section also contains additional information on the construction of some variables.

[14] Summary Statistics Table A1 only provides information on continuous dependent, explanatory and control variables. Categorical control variables are not present in this table.

[15] On occasion the abbreviation adj. (adjusted) is included in front of the name of the variables. This implies that the following formula is applied, to make an adjustment, given in by non-normality: (Variable – 1) / (Variable + 1). This method adjusts for non-normality for variables which have an infinite scale and generally do not take on a negative value. See Appendix A1 for further information.

Skill variable and the Vertical Relatedness variable shows a value of 0.2036, which is significant at a one percent level ($p < 0.01$). Furthermore, the control variables Stock βeta and the Natural Logarithm of Total Asset show a high positive correlation of 0.4043. However, based on the results in Summary Statistics Table A1 and A2, there is no reason to expect that practical problems will emerge when performing analyses.

Summary Statistics Table A2: Correlations Dataset One

		1	2	3	4	5	6	7
1	**LN Total Assets**	1.00						
2	**LN Firm Age**	0.1352*	1.00					
3	**Adj. Return on Assets**	-0.1558*	-0.1762*	1.00				
4	**Adj. Capital Percentage Assets**	0.0317*	-0.2081*	0.1287*	1.00			
5	**Stock βeta**	**0.4043***	-0.1719*	-0.1609*	-0.1224*	1.00		
6	**Adj. Human Skill Relatedness**	0.0415*	0.0400*	0.0070*	-0.0230*	-0.0096*	1.00	
7	**Vertical Relatedness**	0.1035*	0.1082*	-0.0715*	-0.0394*	0.0531*	**0.2036***	1.00

* = Significant at a 1% level

In Summary Statistics Table B1, the summary statistics regarding the dataset for testing hypotheses two and three, is shown.[16] As can be derived from this table, each variable includes 213 observations. Furthermore, it can be derived that some variables, i.e. LN Total Assets and Human Skill Relatedness, are adjusted for non-normality.

Summary Statistics Table B1: Summary Statistics Dataset Two

		N	Mean	SD
1	**Stock Price Movement**	213.00	0.0074	0.0359
2	**LN Total Assets**	213.00	7.8069	1.6048
3	**Firm Age**	213.00	68.6854	52.1663
4	**Return on Assets**	213.00	5.4463	5.5461
5	**Capital Percentage Assets**	213.00	59.4890	13.6162
6	**Stock βeta**	213.00	0.9030	0.2638
7	**Adjusted Human Skill Relatedness**	213.00	0.1960	0.7856
8	**Vertical Relatedness**	213.00	0.1143	0.1365

From Summary Statistics Table B2 it can be concluded that the same correlation pattern emerges as in the first dataset. This means that the relatedness measures are again to some extent positively correlated. Namely, the two measures for relatedness show a correlation of 0.2663, which is significant on a one percent level ($p < 0.01$). Furthermore, some correlation between the control variables becomes visible, of which the most remarkable degree of correlation is between Firm Age and Capital Percentage of Assets (-0.4721, $p < 0.01$).

[16] Appendix Table A2 contains more detailed information on the variables included in this dataset.

Summary Statistics Table B2: Correlations Dataset Two

		1	2	3	4	5	6	7	8
1	**Stock Price Movement**	1.0000							
2	**LN Total Assets**	0.0628	1.0000						
3	**Firm Age**	0.0068	**0.3606***	1.0000					
4	**Return on Assets**	-0.0026	0.01144*	0.1249*	1.0000				
5	**Capital Percentage Assets**	0.0290	0.0400	**-0.4721***	**0.3131***	1.0000			
6	**Stock βeta**	0.0914	0.1032	-0.0924	-0.1701 *	-0.1109	1.0000		
7	**Adjusted Human Skill Relatedness**	-0.0484	-0.0165	-0.1402*	0.0743	-0.0296	0.0230	1.0000	
8	**Vertical Relatedness**	0.1472*	-0.0132	-0.1591*	-0.0164	-0.0817	0.1402*	**0.2663***	1.0000

*=Significant at a 1% level

5.2 Descriptive Statistics

This study focuses on one hundred firms, of which 7 firms (7 percent) are not diversified. The remainder of the firms in the database (93 percent) are to some extent diversified. The extent to which the firms are diversified is depicted in Descriptive Statistics Table A1. The final category consists of firms that have reported five or more secondary activities. The extent of diversification goes up till thirteen secondary activities. Based on the mean values of the Human Skill Relatedness (RSR) and Vertical Relatedness (VR) variables, depicted in Descriptive Statistics Table A1, it can be concluded that there is no significant relation between the tendency of firms to diversify and the extent to which firms are diversifying in a related manner.[17]

Descriptive Statistics Table A1: Related Diversification

Diversification	Frequency	Percent	Mean(RSR)	Mean(VR)
0 Activities	7	7%	-0.5911	0.0402
1 Activities	16	16%	-0.5736	0.0367
2 Activities	13	13%	*-0.6837*	0.0275
3 Activities	24	24%	*-0.6908*	0.0215
4 Activities	14	14%	*-0.6479*	0.0272
5 Or more activities	26	26%	-0.5863	*0.3930*
Total / Mean	**100**	**100%**	**-0,6289**	**0.0910**

The degree of relatedness of the diversified activities with respect to the firm's core activity (R_{xy}) is displayed for the Human Skill Relatedness (RSR) and Vertical Relatedness (VR) measure in Descriptive Statistics Table A2. From this table can be clearly derived that the degree of R_{xy}, shows a much greater mean value for the RSR and VR variable, for activities which are present in the firm's industrial portfolio compared to activities which are not present in the portfolio. For instance, from the table can be derived that the mean value for RSR is significantly larger for activities which are present in the industry portfolio (0.1967) compared to activities which are

Descriptive Statistics Table A2: Relatedness and Presence

Presence	Mean(RSR)	Sd(RSR)	Mean(VR)	Sd(VR)
0	-0.6567	0.5943	0.0295	0.0643
1	0.1967	0.7907	0.1165	0.1434

[17] An F-test, comparing the difference in means by the multiple diversification categories, provided that there are no significant differences between the multiple groups ($p > 0.10$).

absent from the portfolio (-0.6567). The same result becomes visible for the vertical relatedness measure.[18]

On the account of several missing and spurious values for the variable Stock Price Movement (PE), the study on the association of relatedness, industry entry and stock price movements is only based on 17 Joint Ventures and 196 Mergers & Acquisitions. The 196 Mergers & Acquisitions include Full Mergers & Acquisitions as well as high stake Partial Mergers & Acquisitions. [19]

Descriptive Statistics Table B1: Entry Mode and Degree of Relatedness

Entry Mode	Mean (RSR)	sd (RSR)	Mean (VR)	sd (VR)
Joint Venture	0.2753	0.8558	0.1442	0.1726
M&A	0.1891	0.7812	0.1117	0.1332

From the literature review, no clear prediction was to be made regarding the influence of relatedness on industry entry. However, in the literature were pointed out some main differences between Joint Ventures and Mergers & Acquisitions, as a mode of entry. Based on these differences, mainly given in by information asymmetries and governance structures, intuitively; it might be more likely to expect that the degree of relatedness is higher for Mergers & Acquisitions compared to Joint Ventures as entry mode. Based on Descriptive Statistics Table B1, it can be concluded that the results are not line with this intuition. By studying the Human Skill Relatedness (RSR) measure, no clear prediction can be made regarding the effect of relatedness on the preferred industry entry mode. When a firm enters a market by the use of a Joint Venture, the mean RSR value is 0.2753. This was slightly higher compared to the mean relatedness value for industry entry via Merger & Acquisitions, which is 0.1891. The same pattern emerges when measuring the degree of relatedness by the Vertical Relatedness (VR) measure. The mean relatedness value for entry by Joint Venture is 0.1442, while for Merger & Acquisition this is 0.1117. Thus, the results of the descriptive statistics are not in line with what could be intuitively expected when examining the effect of relatedness on industry entry. Thereby, a t-test on means between the relatedness values, distinguished by the modes of entry, does not show a significant difference between the

[18] Based on a two sample t-test with equal variances, the results show significant differences in the means of the relatedness variables performed on the basis whether an activity is present in an industrial portfolio. Namely, the results based on RSR *($p < 0.01$)* and VR *($p < 0.01$)*. Note: for the complete output tables, see Appendix Table B1 and Appendix Table B2.

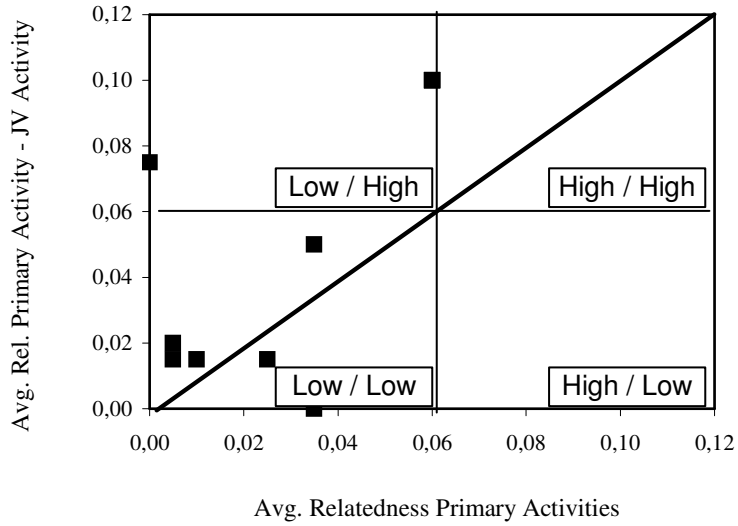
[19] For a more detailed description of dropped observations on the study of the relation between related industry entry and stock price movements, see Appendix A1.

means.[20] Although, the descriptive statistics lack to make a clear prediction concerning the relation between relatedness and the preferred mode of industry entry, Joint Ventures as a stand-alone entry mode remain interesting to examine. According to the literature, it can be stated that a Joint Venture can be considered as a way for firms to develop and exploit new product market combinations by the pooling of knowledge, with cooperation of other parties. In this sense, a Joint Venture can be seen as a manner to exploit an activity in which the resource and knowledge base of firms amplify each other. This should imply that the degree of relatedness of the firms' core activities to the Joint Venture activity (R_{xy}) is higher than the degree of relatedness between the core activities of the collaborating parties involved in the Joint Venture (R_{xx}). This statement is to some degree supported by the results in Descriptive Graph Table B2 and Descriptive Statistics Graph B3.[21] For studying these graphs it is important to consider the diagonal line as a point of reference. If a point is located above the diagonal line, $R_{xy} > R_{xx}$, while if a point is situated below the diagonal $R_{xy} < R_{xx}$. Studying the points of intersection in both figures, it remains clear that in many occasions R_{xy} shows a higher degree of relatedness compared to R_{xx}. Furthermore, when studying Descriptive Statistics Graph B3, it becomes clear that many observations are located in the quadrants $Low / High$ or $High / High$. Since the observations are mainly situated in the upper quadrants of the figure, the conclusion can be drawn that R_{xy} is relatively higher than R_{xx}, for the vast majority of the observations.

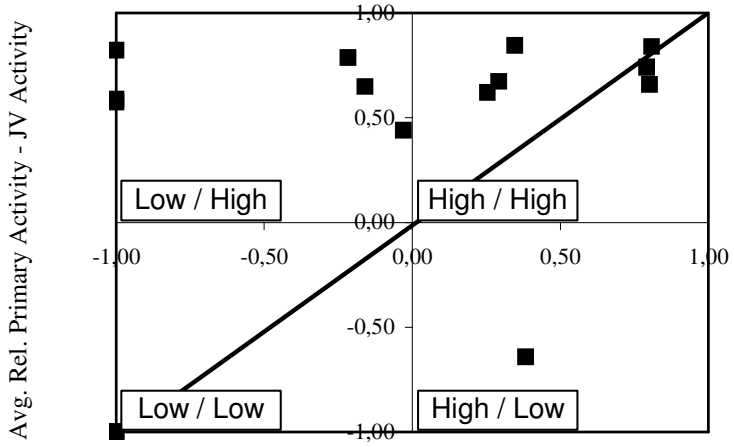
[20] Based on a two sample t-test with equal variances, the results show no significant differences in the means of the relatedness variables performed by the different entry modes. Namely, the results based on RSR *(p > 0.10)* and VR *(p > 0.10)*. Note: for the complete output tables, see Appendix Table B3 and Appendix Table B4.

[21] Notes concerning Descriptive Statistics Graph B2 and B3: Avg. Rel. Primary Activities: Average Relatedness between Firm's Primary Activities in Joint Venture. The Average Relatedness measure between the primary activities is divided by two, due to the asymmetric characteristic of the measure. Avg. Rel. Primary Activity – JV Activity: Average Relatedness between the different Primary Activities in relation to the Target Activity. The Relatedness values are added and divided by the number of parties who are participating in the Joint Venture. Due to technical difference between Joint Ventures with two and three collaborating partners, Joint Ventures with three participants are omitted from this analysis. Note: For some industry combinations it was not possible to define a relatedness value. Furthermore, on occasion the primary activities of the participants in the Joint Ventures are identical; these cases are omitted from the analysis. In addition, another vertical relatedness value was omitted, since this value of 0.22, drastically biased the analysis.

Descriptive Statistics Graph B2: Vertical Relatedness: An Application to Joint Venture Collaboration



Descriptive Statistics Graph B3: Human Skill Relatedness: An Application to Joint Venture Collaboration



When examining the effect of related industry entry on a stock price movement, it is also important to take into account the impact of the entry mode, as standalone decision, on the stock price movement. To explore this effect, of which the results are displayed in Descriptive Statistics Table C1, the different impacts of industry entry on stock price movements, were assigned to different categories.[22] This relative impact is varying

Descriptive Statistics Table C1: Effect of Entry Mode on Stock Price Movements

Entry Mode: Joint Venture			Entry Mode: Merger & Acquisition		
Stock Price Change	Occurrence	Percentage	Stock Price Change	Occurrence	Percentage
0	6.00	35,29%	**0**	48.00	24,49%
1	3.00	17,65%	**1**	49.00	25,00%
2	6.00	35,29%	**2**	47.00	23,98%
3	2.00	11,76%	**3**	52.00	26,53%

0 = High Negative, 1= Negative, 2= Positive, 3= High Positive Returns

[22] Extensive statistics on the stock price movements, segmented by the four categories, can be found in Appendix Tables B6 and B7.

from category zero (high negative stock price reactions) to category three (high positive stock price reactions).[23] Considering the aim of this study, it is of importance to point out that the stock price movements serve as a proxy for firm performance. The stock price movement, as a reaction to a market transaction, could be particular valuable in assessing the opinion of the market on the characteristics of the transaction, in relation to future firm performance. Despite, the major differences between Merger & Acquisition and a Joint Venture as an entry mode, as mentioned in the literature review, no clear difference in market reactions can be derived from Descriptive Statistics Table C1.

Although, based on the latter analysis, it can be stated that the industry entry mode did not seem to be a valid determinant for reactions of the market, it could still be that related market entry is. Similar to the analysis of the relation between industry entry and stock price movements, this analysis is also based on market reactions which are assigned to the four equally distributed categories. From a relative perspective, these categories also vary from high negative returns to high positive returns and are constructed in the same way as in the latter analysis. The stock price movements are distinguished on the basis of different industry entry modes, to perform this analysis, on a more detailed level.

Descriptive Statistics Table C2: Relatedness: An Application to Stock Price Movements

Entry Mode: Joint Venture					*Entry Mode: Merger & Acquisition*				
Stock Price Change	**Mean (VR)**	**Sd(VR)**	**Mean(RSR)**	**Sd(RSR)**	**Stock Price Change**	**Mean(VR)**	**Sd(VR)**	**Mean(RSR)**	**Sd(RSR)**
0	0.1112	0.1332	0.4985	0.7385	**0**	0.0955	0.1246	0.0561	0.8170
1	0.2981	0.1340	0.2869	1.1146	**1**	0.0957	0.1402	0.2619	0.7199
2	0.1017	0.2180	-0.0906	0.9972	**2**	0.1082	0.1290	0.3152	0.7170
3	0.1396	0.1621	0.6863	0.3086	**3**	0.1450	0.1354	0.1294	0.8527

0 = High Negative, 1= Negative, 2= Positive, 3= High Positive Returns

As can be derived from Descriptive Statistics Table C2, no clear difference can be observed between the average relatedness values – Mean (VR) and Mean (RSR) - and the market reaction, when a firm is entering a market through a Joint Venture.[24] However, these results seem to be fairly different when focusing the analysis on Merger & Acquisition as a mode of industry entry. From the descriptive statistics it is interesting to see that the stock price

[23] The stock price movements are assigned to categories on a straightforward manner, based on the quantile in which the observation is present. This implies that a return is highly negative if the observation is in the first quantile (0 % – 25 %), the observation is negative if it is located in the second quantile (25 % – median), positive in the third quantile (median – 75 %) and highly positive if present in the fourth quantile (75 % - 100 %). Since, the change in stock price is a continuous variable and thus includes several heterogeneous values; it is easier to analyze the descriptive statistics by categorizing the variable.

[24] Note: there are only 17 Joint Ventures present in the dataset. Dividing these observations in different categories, could dilute the effect of the average firm-market relatedness on the stock price movement.

movement, of the acquiring firm, is more positive when firms enter or expand in an industry which is to a higher degree, vertically related to the firm's core activity. However, this pattern is especially emerging when measuring firm-market relatedness based on the value chain. When examining the effect of firm-market relatedness, based on the Human Skill Relatedness variable, a completely different pattern emerges. Studying the results in Descriptive Statistics Table C2 seems to indicate a non-linear relationship between the degree in which a firm diversifies over a resource related path and the reaction by the stock market. This seems to indicate a certain threshold in market valuation for the degree to which firms diversify in a related manner, based on their current resource base.[25] When focussing the analysis on the information included in Appendix B1, which provides an insight on the relationship between stock price movements and relatedness on a more detailed level, the non-linear effect still seems to hold. However, the linear relationship between vertically related diversifications and stock price movements seems to become somewhat delusive. Based on this, it remains interesting to be seen whether the regression analysis provide support for the patterns found in the descriptive statistics.

6. Methodology and Results

6.1 **Logistic Regression Models** (Hypotheses One and Two)

The estimation of a firm's choice of entry mode is based on a standard logistic regression model:

(1) $$P = \frac{1}{1 + e^{-(\beta X)}}$$

In examining whether a firm's composition of activities is coherent (Hypothesis one), the dependent variable is defined as one in cases a firm is present in an industry, and zero when the industry is absent from the firm's industrial portfolio. For testing Hypotheses 2a and 2b the dependent variable is defined as one in cases of entry via Merger & Acquisition, and zero when the entry mode is by a Joint Venture. The probability, *P*, is modeled as a logistic distribution function, where *X* includes the characteristic of the firm, the characteristic of the

[25] To examine the effect of the degree of related diversification on the stock price movement on a more detailed level, Appendix B1 includes some tables and graphs. These tables and graphs provide information for the non-linear relationship between resource related diversification and stock price movements that seems to be present. To examine whether the results, depicted in Descriptive Statistics Table C2 hold, the stock price movements are assigned to eight equally distributed categories.

market, and the measure of relatedness between the firm's primary activity and the activity targeted on the market. The estimated coefficients are β.

(Logistic) Regression Model One: Results

To analyze whether relatedness influences the probability that a firm operates in a certain industry, and thus portfolio composition, three logistic regression analyses are performed. The results of these analyses are presented in table A1.[26]

Results Table A1: Relatedness: An Application to Portfolio Composition

Logit Model	**(1)**	**(2)**	**(3)**
Firm-Level Controls			
LN Total Assets	-0.0024	-0.4252	-0.0714 **
	(0.0340)	(0.0354)	(0.0360)
LN Firm Age	0.1728 **	0.1555 **	0.1674 **
	(0.0798)	(0.0799)	(0.0826)
Adj. Return on Assets	-0.0120	-0.0593	-0.0941
	(0.0851)	0.0884	(0.0911)
Adj. Capital Percentage Assets	-14.0760 **	-14.4658 **	-13.1624 **
	(5.8227)	(5.9462)	(5.9564)
Firm Risk	0.4779 **	0.6058 ***	0.6533 ***
	(0.1955)	(0.2059)	(0.2133)
Industry-Level Controls			
Dummy cat. 2	-0.2023	-0.4215	-1.8940
	(0.2660)	(0.2719)	(0.28807)
Dummy cat. 3	-0.3487	-0.6301 **	-0.0584
	(0.2948)	(0.3042)	(0.3284)
Dummy cat. 4	0.1487	-0.0713	-0.4137
	(0.3123)	(0.3182)	(0.3367)
Dummy cat. 5	-0.0976	-0.4030	0.2198
	(0.2878)	(0.2930)	(0.3158)
Dummy cat. 6	-0.7484 **	-0.8440 *	-0.4688
	(0.3206)	(0.3269)	(0.3424)
Dummy cat. 7	-0.3019	-0.5920 **	-0.4364
	(0.2742)	(0.2796)	(0.2926)
Dummy cat. 9	-1.4167	-1.7006 *	-2.0796 **
	(1.0328)	(1.0357)	(1.0626)
Measures of Portfolio Coherence			
Adj. Human Skill Relatedness		1.6857 ***	1.4255 ***
		(0.0875)	(0.0897)
Vertical Relatedness			5.9945 ***
			(0.4768)
Constant	8.035	9.2301 *	7.5239
	(5.7034)	(5.8047)	(5.8037)
Log Likelidhood	-1624.4411	-1416.1906	-1349.7764
Psuedo R-Square	0.0139	0.1403	0.1806
Number of Observations	35.260	35.260	35.260

* significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Industry Level control dummies are included in all models. The categories refer to different industries on a one digit NACE 1.1 level. Due to missing values for Human Skill Relatedness and Vertical Relatedness measure, some observations are omitted from the regression model. This, to regress for the same number of observations in all models.

[26] For all regression analyses: information regarding the adjustments based on non-normality can be found in Appendix A1.

In Model (1) only the control variables are included in the regression analysis. Thus, in this model the relatedness variables are omitted from the analysis. Based on Model (1), no clear predictions can be made concerning the relation of the control variables and the likelihood that an activity is present in the portfolio of a firm. The low R^2, 1.39 percent, is a reason that no strong conclusions can be drawn from the results in Model (1). Apart from the low R^2 value in Model (1), it can be stated that Model (2) and Model (3) also lack to show a clear relationship between the industry-level control variables and the likelihood that an activity is present in the firm's portfolio.[27] To a smaller degree, this is also true for the firm-level control variables. However, these variables, which are denoting the firm's financial resources and general firm characteristics, show some significant results on a one percent level. In Model (2), the Human Skill Relatedness variable is added to the regression analysis. As can be derived from this model, the Human Skill Relatedness variable has a clear positive significant effect on the likelihood that an activity is present in the firm's portfolio, on a one percent significance level. Adding the Human Skill Relatedness variable also reveals added explanatory power. This becomes visible when comparing the R^2 value of Model (2) with the R^2 values of Model (1), this shows an increase of about 12.5 percent compared to the value of 1.39 percent in Model (1). In Model (3) the Vertical Relatedness measure is added to the model. This again reveals added explanatory power to the model. Adding the Vertical Relatedness measure to the Model, does not causes the Human Skill Relatedness measure to become insignificant. In contrary, both the Human Skill Relatedness measure as well as the Vertical Relatedness measure are significant at a one percent level. This provides strong support for Hypothesis one, that both relatedness measures influence the probability that an activity will be present in an industry portfolio in a positive manner. This implies that the Resource Based View and the Transaction Costs Economic Theory are including important motives for firms to diversify in a related manner and to establish a coherent portfolio. Although, from the results in table A1, it is difficult to state which relatedness measure is more important from the firm's point of view.[28]

[27] The descriptive statistics also lacked to show a clear relationship between the industry level control variables at a NACE 1.1 one digit level and the composition of firm portfolios.

[28] To estimate the changes in the predicted probability associated with changes in the explanatory variables, the estimates from the discrete choice model (1/0) need to be transformed for the marginal effect to become visible. That is, the change in the predicted probability. To transform these variables the parameters need to be normalized.

However, the results in Results Table B1 do provide information on the marginal effects of the independent variables on the dependent variable (Presence).[29] Based on this information it is possible to assess which relatedness variables can be considered as a more important motive for firms to construct their portfolio upon. As can be derived from the information in table B1, moving half a Standard Deviation to the right for the Human Skill relatedness variable, causes an increase in the predicted probability that an activity is present in the industry portfolio of 0.0031. The vertical relatedness measure provides an increase of 0.0013. From this, it can be concluded that the opportunity for diversification, closely related to the current resource base of the firm, is considered to be more essential for an activity being present in the portfolio, than the opportunity for vertical integration, - measured by the vertical relatedness variable.

Results Table B1: Changes in Probabilities for Presence

Different Ranges Pr(y/x) 0.9964 0.0036	**- / + sd / 2**
Measures of Portfolio Coherence	
Adj. Human Skill Relatedness	0.0031
Vertical Relatedness	0.0013

(Logistic) Regression Model Two: Results

To analyze whether the degree of firm-market relatedness has an effect on the industry mode of entry, three regression analyses are performed. The results displayed in Results Table A2 refer to the likelihood for the firm to choose Merger & Acquisition as entry mode. Where EntryMode takes on a value of one if the firm enters a market through acquisition and zero if the firm enters a market by collaborating with multiple partners in a Joint Venture. [30]

[29] Complete information, on the marginal effect, of all the variables, on changes in the probability for an activity to be present in an industrial portfolio, can be found in Appendix Table C1.

[30] Note: both modes of entry are options for a firm when it wants to *buy* a certain activity. In this dataset the Joint Venture is a mode of entry where multiple parties acquire an activity by collaboration. The *make* option to enter a certain market is not considered in this analysis.

Results Table A2: Relatedness: An Application to Industry Entry

Logit Model	**(1)**	**(2)**	**(3)**
Firm-Level Controls			
LN Total Assets	-1.0682 ***	-1.0634 ***	-1.0695 ***
	(0.3420)	(0.3437)	(0.3481)
Firm Age	0.0092	0.0078	0.00817
	(0.0082)	(0.0083)	(0.0088)
Return on Assets	-0.0031	-0.0065	-0.0075
	(0.0717)	(0.0704)	(0.0711)
Capital Percentage Assets	-0.0269	-0.0296	-0.0285
	(0.0396)	(0.0391)	(0.0404)
Firm Risk	3.9293 **	3.9025 **	3.9137 **
	(1.7716)	(1.7720)	(1.7728)
Industry-Level Controls			
Dummy cat. 2	0.7542	0.9654	0.9998
	(1.0316)	(1.0493)	(1.0927)
Dummy cat. 3	0.5191	0.5692	0.6053
	(1.0974)	(1.1032)	(1.1517)
Dummy cat. 4	-2.3892	-2.1672	-2.1822
	(1.7884)	(1.7881)	(1.7913)
Dummy cat. 5	-0.1485	0.0620	0.1114
	(1.2273)	(1.2174)	(1.3342)
Dummy cat. 7	-1.4024	-1.2006	-1.1742
	(1.3468)	(1.3593)	(1.3803)
Measures of Firm-Market Relatedness			
Adj. Human Skill Relatedness		-0.3903	-0.3924
		(0.3921)	(0.3923)
Vertical Relatedness			0.2334
			(2.1868)
Constant	8.9458 **		9.0662 **
	(3.7092)		(3.8548)
Log Likelidhood	-45.816359	-45.291487	-45.285776
Psuedo R-Square	0.2074	0.2165	0.2166
Number of Observations	196.00	196.00	196.00

* significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Industry Level control dummies are included in all models. The categories refer to different industries on a one digit NACE 1.1 level. Dummy Cat. 6 is omitted from the regression analysis, since it includes no observations.

In Model (1), only the control variables are included in the analysis. As can be derived from Model (1), only the variables, LN Total Assets (Natural Logarithm of Firm's Total Assets) and Firm Risk are significant at a one percent and five percent significance level respectively. The other control variables are insignificant at a ten percent significance level. This accounts for the control variables on the firm-level and on the industry-level. When studying the results of Model (2), the same pattern appears. In contrary to Model (1), the human skill relatedness variable is now added to the model, as the analysis is build up by a stepwise-method. However, this relatedness variable lacks to show a relation, on a ten percent significance level,

between the method of market entry and the degree of firm-market relatedness. However, as already mentioned, the same pattern emerges as in Model (1). This because, LN Total Assets ($p < 0.01$) and Firm Risk ($p < 0.05$) are again significant. In Model (3) the vertical relatedness measure is added to the model. By adding this variable to the model, it can be derived that the proxy for vertical relatedness is not significant on a ten percent significance level. Thus, it can be concluded that this relatedness variable also lacks to show a clear relationship between the mode of market entry and the degree of relatedness between the acquiring and target industry.

Because, in Model (1-3), the variables LN Total Assets and Firm Risk are the only variables which are significant, it is decided to omit the other control variables from the regression analysis. The results of this regression analysis can be found in Appendix Table D1. This analysis might show a clearer picture of the effect of the degree of relatedness on the preferred mode of industry entry. However, the results in Appendix Table D1 clearly provide no support, for the arguments made in the theoretical framework. Furthermore, from the results in Appendix Table D1, it can be derived that the significance level of Firm Risk drastically changes in these models. Namely, the variable now lacks to show a significant effect on the mode of industry entry ($p > 0.10$). In sum, the regression results do not show a relationship between the degree of firm-market relatedness and the preferred mode of industry entry. This implies that the degree of relatedness has no demonstrable effect on the firm's choice between a Joint Venture and Merger & Acquisitions as the preferred mode of industry entry.

6.2 Linear Regression Model (Hypothesis Three)

The assessment of the stock price movements in response to a firm's strategic decision on what markets to enter is based on a standard linear regression model:

(2) $$Y = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_n x_{in} + \varepsilon_i$$

Where Y is the dependent variable, which depicts stock price movements. The dependent variable (PE) is a linear function of firm characteristics, the characteristics of the market transaction and the measures of relatedness.

(Linear) Regression Model Three: Results

Results Table A3: Relatedness: An Application to Firm Performance (Stock Price Movement)

OLS Model	(1)	(2)	(3)	(4)	(5)	(6)
Firm-Level Controls						
LN Total Assets		0.0017	0.0020	0.0004	0.0005	0.0000
		(0.0026)	(0.0027)	(0.0026)	(0.0027)	(0.0027)
Firm Age		0.0000	0.0000	0.0000	0.0000	0.0000
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Return on Assets		0.0001	0.0001	0.0003	0.0002	0.0002
		(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Capital Percentage Assets		0.0002	0.0002	0.0002	0.0003	0.0003
		(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Firm Risk		0.0086	0.0083	0.0089	0.0098	0.0064
		(0.0113)	(0.0113)	(0.0110)	(0.0112)	(0.0116)
Industry-Level Controls						
Dummy cat. 2		-0.0004	0.0007	0.0091	0.0102	0.0123
		(0.0114)	(0.0116)	(0.0116)	(0.0119)	(0.0120)
Dummy cat. 3		0.0216 **	0.0220 *	0.0321 **	0.0317 **	0.0339 **
		(0.0132)	(0.0132)	(0.0133)	(0.0133)	(0.0134)
Dummy cat. 4		0.0003	0.0026	-0.0115	-0.1054	-0.0061
		(0.0201)	(0.0207)	(0.0206)	(0.2084)	(0.0209)
Dummy cat. 5		0.0120	0.0140	0.0273 *	0.0281 *	0.0333 *
		(0.0160)	(0.0166	(0.0167)	(0.0168)	(0.0170)
Dummy cat. 6		-0.0046	-0.0038	0.0090	0.0097	0.0151
		(0.0151)	(0.0152)	(0.0153)	(0.0155)	(0.0157)
Dummy cat. 7		0.0096	0.01144	0.0144	0.0146	0.0179
		(0.0123)	(0.0128)	(0.0126)	(0.0126)	(0.0127)
Measures of Firm-Market Relatedness						
Adj. Human Skill Relatedness	-0.0044		-0.0018	-0.0044	-0.0036	-0.0135
	(0.0034)		(0.0036)	(0.0036)	(0.0040)	(0.0436)
Vertical Relatedness	0.0513 ***			0.0759 ***	0.0736 ***	0.0822 ***
	(0.0200)			(0.0236)	(0.0242)	(0.0246)
Adj. Human Skill Relatedness Sq.					0.0044	-0.0113
					(0.0099)	(0.0362)
Adj. Human Skill Relatedness Dummy Cat. 1						0.0141
						(0.0757)
Adj. Human Skill Relatedness Dummy Cat. 3						0.0251
						(0.0199)
Transaction-Level Controls						
Constant	0.0032	-0.0337	-0.0351	-0.0477 *	-0.0547 *	-0.0602 *
	(0.0033)	(0.0272)	(0.0274)	(0.0270)	(0.0312)	(0.0314)
R-Square	0.0251	0.0545	0.0558	0.1066	0.1076	0.1232
Number of Observations	196.00	196.00	196.00	196.00	196.00	196.00

* significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Joint Ventures are taken into account for the descriptive statistics (pages 29-31) but are omitted from the regression analyses, as Joint Ventures are presented in a different manner compared to Merger and Acquisition. An example for this is that multiple parties are needed for the establishment of a Joint Venture, while an acquisition only involves one acquiring party.

The Stock Price Movement (PE), which depicts the change in stock price as a reaction to the market transaction, concerns the Stock Price of the acquiring public firm that was also present in the first dataset, used for the analysis on portfolio composition.

Results Table A3 provides the outcomes of the regression analyses with the stock price movement of the acquiring firm (PE) as the dependent variable.[31] In Model (1) only the relatedness variables are included in the model. This means that the firm-level, industry-level and transaction-level control variables are omitted from this regression analysis. In Model (1), the vertical relatedness measure is positively related to the stock price movements of the acquiring firm. This variable is significant at a one percent level. This could be an indication that transactions, causing firms to become vertically integrated, are valued highly by stockholders. The results from Model (1) also show a negative stock price reaction to diversifications which are highly related to the firm's primary activity, based on the human skill relatedness measure. Although, the sign for the human skill relatedness variable is negative, it is not significant. In Model (2) the control variables are added to the regression model. However, the relatedness variables are now omitted from the analysis. The control variables included in Model (2), do not provide a clear explanation for the stock price movements as a result of a Merger & Acquisition. In Model (3), the human skill relatedness variable is added to the model. Again, the sign in front of the variable is negative. However, the variable is again not significant at a ten percent significance level *(p>0.10)*. In Model (4), the control variables and relatedness variables are included in the regression model. Again, the human skill relatedness variable is insignificant *(p>0.10)*. However, it is more interesting to conclude that the positive significant effect of the vertical relatedness measure, on the stock price movement in reaction to an acquisition, still holds on a one percent significance level *(p<0.01)*. The vertical relatedness measure can be interpreted as follows: if the vertical measure of relatedness increases by approximately one standard deviation, this causes an increase in the firm's stock price by nearly 0.18 percent.[32] Furthermore, it is important to highlight the significant increase in explanatory power of Model (4) in comparison to Model (2). This can be derived from the increase in R^2 values from 5.45 percent in Model (2) to 10.66 percent in Model (4) respectively.[33] In Model (5), the squared value of the human skill relatedness variable is added to the regression analysis. This variable is modeled, because of

[31] Statistical background information (VIF Values and Normal Distribution of residuals) concerning Model (4) – which can be considered as the *full* model – in Table A3 can be found in Appendix E1.

[32] As the vertical relatedness values are located on an interval between zero to one, and thus the variable is unable to increase by one, the coefficient is interpreted as follows: $\Delta y(Stock\ \mathrm{Pr}\ iceMovement) = Sd \cdot b$. As the Δx is defined as the Sd of the coefficient, the estimated parameter is multiplied by $0.25 \approx 0.0236$.

[33] A partial F-test comparing, Models 2 and 4, reveals that adding the relatedness measures, after accounting for the firm,- and industry-level controls, significantly adds to the explanatory power of the variance in the dependent variable ($p < 0.10$).

the non-linear pattern which seemed to be present in the stock price movements as a reaction to Mergers & Acquisitions over a resource related path. When examining Model (5), it can be derived that the coefficients actually show a change in sign when comparing the original human skill relatedness variable to the squared human skill relatedness variable. Although, the variables are insignificant, the non-linear pattern seems to hold in the regression analysis. In addition, to further clarify this non-linear pattern, a dummy variable is constructed to categorize the adjusted human skill relatedness values.[34] Subsequently, the dummy variable was regressed in Model (6); dummy category two is omitted from the regression model and serves as the reference category.[35] By studying the coefficients of the dummy variables, a non-linear pattern again becomes visible, as the results demonstrate the following: $\beta DummyCat.1 > \beta DummyCat.2 < \beta DummyCat.3$. However, the coefficients are not significantly different.[36] This causes that it is hard to draw any conclusions from the latter analysis, concerning the presence of a non-linear relational pattern. Overall, the analyses provide strong support ($p < 0.01$, for all Models) that acquisitions, causing firms to become vertically integrated, are conceived positively by the stock market. Furthermore, the outcomes shown in Results table A3 provide no support that resource related acquisitions, measured by the human skill relatedness variable, play a role in the market valuation of firm on the short term. However, prove was found for a non-linear relationship between resource related diversifications and the market valuation of firms.

7. Limitations and Further Research

7.1 Limitations

The analyses in this article are limited to the choice of entry, ignoring broader elements which play a role in industry entry. Although, this study considers vertical integration as a motive for industry entry, which is not very common in relatedness studies which focus their research on product-market entry, it ignores the possibility of firms to add a product-market combination

[34] The adjusted human skill relatedness values are assigned to three different categories. The first category includes the human skill relatedness values which range from -1.00 to -0.33; the second category consists of values that vary from -0.33 to 0.33, while the final category covers the values from 0.33 up to 1.00. Due to an asymmetric distribution, it was not possible to segment the adjusted human skill variable into more than three categories. More detailed information on the composition of the different categories can be found in Appendix Table E3.

[35] It is decided to naturally omit the second dummy category from the regression model, as this is the middle group. By omitting this category, it is easier to study the non-linear effect.

[36] Based on a F-test, the results show no significant differences between the means of the human skill relatedness dummy categories *($p > 0.10$)*. Note: for the complete output table, see Appendix Table E4.

to the portfolio by making the product in-house. This implies that firms, in contrary to the suggestion of this study, are not compelled to diversify / expand their portfolio by conducting transactions on the market. The possibility of in-house production is omitted from this analysis due to the lack of information on portfolio development.

The lack of information on portfolio development also compels this study to consider firm portfolios and characteristics to have remained static, while in fact they evolve over time. This implicates, that firm information, over the year 2009, is used to control for events that have occurred over time.[37] Due to the absence of this information, this study limits in its ability to make the connection between the firm's portfolio composition, at times of an event, and the manner in which firms decide to enter industries. From a theoretical point of view, this implicates the following: as has been made clear, portfolios are coherent to the extent that their constituent businesses are related to one another (Teece, 1992). According to Bryce and Winter (2008), knowledge-based theories suggest that firms enjoying very tight coherence in their activities, with respect to their primary activity, would be more likely to possess and deploy specific knowledge in entry decisions. The converse is also true, as less coherent firms are more likely to deploy general knowledge, such as in Mergers & Acquisitions (Montgomery and Wernerfelt, 1988). Thus, exclusion of a variable, which depicts portfolio coherence at times of an acquisition, could cause a puzzling effect in the independent effect of knowledge specificity to the target industry.

Finally, this study limits in the ability to mutually compare the measures of relatedness, since the vertical relatedness measure was solely available on a higher aggregation level. Namely, the analysis of the human skill relatedness was performed at a NACE 1.1 classification code on a four digit level, while the vertical relatedness variable was presented at a NACE 1.1 code on a two digit level. This made comparing the relatedness measures somewhat uneven, which causes that estimating the relative importance of the rationale behind the measures of relatedness, becomes more difficult.

[37] For the analyses, this study uses static information over the base year 2009, to control for transactions performed by firm which have occurred in the period 2000 till 2010. This implies that the research results strongly rely on the assumption that general firm characteristics do not differ significantly over a period of ten years. This means that this study considers firm portfolios and firm characteristics to be fairly stable over time.

7.2 Further Research

First, this research focuses on hundred publicly owned Dutch firms of which the portfolio composition and market activities are examined. Despite, the fairly heterogeneous backgrounds and characteristics of the firms present in the sample, it could be valuable to examine if the results hold for a different sample. This, because it is not self-evident that activities which are strongly related in one country are also strongly related in another (Neffke, Henning and Boschma, 2009). According to Neffke et al. (2009), different historical backgrounds and conditions may lead to different configurations of relatedness between industries. In this sense, one can think of an extension of the current database with firms that are listed on the stock markets in Belgium and Luxembourg.[38] Next to, an extension of the current dataset, it might also be interesting to examine whether the results hold for publicly owned firms, listed on a stock exchange with fairly different laws and regulations. A possible sample that could likewise serve as a benchmark for future research, would be obtaining a composition of firms listed on the S&P500. Because of the fairly heterogeneous composition of this index, a study using this sample, would already be able to control for different configurations of relatedness between industries.

Second, this research paper provided insights on the portfolio composition of firms and the importance of different types of relatedness in constructing these portfolios. Interesting opportunities to further examine the phenomenon of firms diversifying over a related path are given in by current data limitations. In this research paper it is decided to measure relatedness on the portfolio-level, with respect to the primary activity of the firm. This activity is considered to be the most important product-market combination present in the firm's portfolio. However, to examine the distance and relative importance of other activities compared to the firm's core activity, it would be valuable to take into account the share of sales for which a certain secondary activity is responsible. Taking into account the size of a certain activity, could be beneficial in examining the composition of the firm's portfolio, by studying the relative distance to the firm's original resource base. Adding this type of information to the analysis, could enhance the quality of a study on portfolio composition.

[38] Examining the portfolios and market transactions of publicly owned firms in the Benelux, with the use of the same controls, would imply working with a sample of 250 firms which are listed on the stock markets in the Netherlands, Belgium and Luxembourg.

Third, this research paper measures stock price movements, as a reaction to a transaction, on the basis of relative change.[39] Although, in the vast majority of research papers, returns are measured in terms of abnormal stock market gains following a transaction announcement. Recent studies which have relied on this methodology, to assess transaction related firm performance are: Merchant and Schendel (2000), Koh and Venkatraman (1991) and Anand and Khanna (2000). For future research it might be valuable to estimate value creation by applying the method of abnormal returns. To estimate this value creation, the following formula needs to be used:

(3) $$r_{it} = \alpha_i + \beta_i r_{mt} + \varepsilon_{it}$$ [40]

By extracting the residuals from the standard asset-pricing model formula, the firms' returns following an event announcement can be predicted (Dyer and Singh, 2002). The estimates obtained, are used to predict returns for each firm over a certain period, surrounding the day on which the event took place. The selection of this period can be chosen in a fairly generic way.[41] In this sense it might also be valuable to assess stock price reactions for different periods, to see whether the results hold. A valuable aspect in this matter is that: in contrary to the application of the relative change of stock prices in a given period, the use of event studies would enable to control for the time period in which the event took place.

Fourth, this article focuses on the role of relatedness in the acquirement of new product-market combination by the firm. The main focus of this research paper is on the possibility of firms to diversify into different activities by acquiring activities on the market. Although, this research focuses on the *buy-side* of portfolio construction, it might be very interesting to examine the *sell-side* of portfolio management. From this perspective, it remains possible to apply the relatedness measures used in this study, though they are applied from a different point of view. Accounting for the fact that firms diversify over a related path (Chatterjee and

[39] The variable PE (Price Effect), which measures the stock price movement, is constructed using the following formula: (Stock Price on Completion Date – Stock Price on Announcement Date) / Stock Price on Announcement Date. Further information on the construction of this variable can be found in Appendix B1.

[40] This formula stems from the market model by Fama (1976). Where r_{it} represents the daily returns for firm *i* on day t, r_{mt} denotes the corresponding daily returns on a certain index. α_i and β_i are firm specific coefficients, and the residual term can be considered following a normal distribution (Fama, 1976).

[41] In prior research (Anand and Khanna, 2000) it is common to use a period of – 3 and + 3 days.

Wernerfelt and Montgomery, Hariharan and Silverman, 1991, 1999), it could provide some new insights, examining whether a firm acts as vendor for activities, unrelated to their core activity. In addition, one could enhance this research, by studying how markets respond to a sale of a certain activity.

Fifth, this research found strong evidence for the relation between firms diversifying in a vertically related manner, and the direction of stock price movements. Although, the results for a positive market reaction on diversification in a vertically related manner were fairly strong, in absence of the assumption that markets are perfectly informed regarding future firm performance, it only supports positive firm performance on the short term.[42] Further research could examine whether the results found on the short term, actually provide a good indication on future firm performance. In this sense, a different proxy for firm performance would be valuable in assessing the effect of the diversification on the long term. Studying the relative change of sales over a longer period, taking into account the relative importance of an acquired activity, would be an applicable research method.

Finally, the lack of information on portfolio development, gives rise to further research concerning the evolvement of a portfolio composition over time. In this manner, it might be possible to sketch the outlines of firm portfolio management. Based on complete information concerning portfolio development, it enables future studies to analyze the firm's make, buy and sell decisions in a broader perspective.

8. Conclusions and Discussion

Basically, this article addresses three separate questions: (1) do firms diversify in a related manner and does this result in portfolios being coherent from a resource based view and / or from the motives which stem from the transaction costs theory; and (2a) does relatedness has an influence on the manner in which product-market combinations are acquired; and (2b) does the degree of relatedness between the target and acquiring activity has an influence on the direction of stock price movement.

This research found strong evidence that the vast majority of secondary activities are to some degree related to the firm's core activity. Implying that firms are not primarily diversifying to

[42] Note: the difference between the announcement and completion date of a transaction is determined on a scale between one till ten days.

lower the firm's risk in order to withstand a general market contraction. This provides support for the statement of Teece (1982), that: "firms do not incorporate the motive to lower the risk of stockholders since all gains of this amalgation could be achieved by stockholders". Based on the results, diversification can be seen as an instrument for stockholders to lower risk, but not primarily for firms. More important, the results provide strong evidence for the presence of economies of integration and scope, in the composition of a firm's portfolio. At first, this means that firms consider it as important, to have to some extent control over their inputs and outputs. By this, firms are less dependent on external supply chain partners since; the dependency on external supply chain partners diminishes. Second, firms consider it as even more important to achieve economies of scope. Meaning, that the degree of portfolio coherence is primarily dependent on the firm's resource base, and not solely on business opportunities. Concluding, this article found evidence that firms follow a dominant diversification strategy over a related path, which results in the construction of a coherent industrial portfolio.

This paper hypothesized that the degree of firm-market relatedness would have some effect on the firm's choice of industry entry. However, the results in this paper provide no support for this phenomenon. Thus, the influence of firm-market relatedness on the firm's choice for Merger & Acquisition or a Joint Venture seems difficult to demonstrate and might be driven by other factors. On the other hand, this paper found some evidence, that a Joint Venture, as a standalone entry decision, can be considered as a vehicle to transfer knowledge and to widen the current resource and knowledge base of a firm. Meaning that Joint Ventures are often strategically positioned between the resource bases of collaborating firms. This could suggest that Joint Ventures are mainly established to bridge the gap between resource and knowledge bases of the collaborating parties, in order to develop a new economic activity.

Based on arguments made by previous authors, it could be expected that Mergers & Acquisitions with a higher degree of firm-market relatedness, would results in a more positive reaction by stockholders. However, the results in this paper lack to support this effect. Implicating, that diversifications related to the firm's resource base, to achieve economies of scope, are valued higher from the perspective of a firm's management, than from a stockholder's perspective. Although, this article found an indication for the presence of a threshold in market reactions to diversifications, related to the firm's resource base. Meaning, that diversifications are to some point prized in a more positive way, if the acquired activity is

to a higher degree related to the firm's resource base. However, at some point, the positive association between acquisitions, highly related to the firm's resource and knowledge base, and the movement of the firm's stock price, diminishes. This could be caused by stockholders, who anticipate that the likelihood of an acquired activity, very closely attached to the firm's current resource base, is minimized in its potential to open up new interesting business opportunities, as it can be considered the same as what the firm has been doing before. So, a highly related diversification, might be limited in its ability to influence future firm performance in a positive manner. This could be an indication for opposing grounds upon which parties base their valuation of a certain acquisition, as this article also showed that firms are primarily diversifying with respect to their available resources. Finally, this article found that diversifications that are to a high degree vertically related to the firm's industrial portfolio, have a positive effect on the market valuation of a firm. Implicating, that stockholders consider it as important that firms have, to some degree, control of their inputs and outputs. Thus, vertical integration is considered to be vital in the composition of a portfolio from both, the perspective of a firm, as well as from the perspective of stockholders.

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Appendices

Appendix A1

If deemed necessary, this appendix provides additional information on the construction and adjustments (based on a non-normal distribution) of the variables. In Appendix Tables A1 and A2, additional information can be found concerning the general characteristics of the variables.

Appendix Table A1: Descriptive Statistics Dataset One

	N	Min	Mean	Median	Max	Skewness	Kurtosis	SD
Dependent Variable								
Presence	50.800	0	0.0070	0	1	11.8027	140.304	0.0835
Explanatory Variables								
Human Skill Relatedness	35.346	0	1.2259	0	315.2819	17.5443	579.8314	5.5726
Adjusted Human Skill Relatedness	35.346	-1	-0.6498	-1	0.9936	1.4014	3.3896	0.6009
Vertical Relatedness	50.700	0	0.0301	0.0070	0.5566	4.2936	25.2014	0.0656
Control Variables								
Total Assets	50.800	0.0800	6783.8620	839.8450	288059.3000	8.6585	81.7957	29585.2900
LN Total Assets	50.800	-2.5257	6.4803	6.7332	12.5709	-0.5116	4.2912	2.3704
Firm Age	50.800	4	51.6	32	174	1.0170	3.1501	40.9706
LN Firm Age	50.800	1.3862	3.5999	3.4657	5.1590	-0.2673	2.4605	0.8770
Return on Assets	50.800	-136.23	1.6208	3.55	103.24	-1.9373	25.7879	20.8244
Adjusted Return on Assets	50.800	-4.5555	0.7592	0.7963	5.4444	-0.0473	**13.4430**	1.1105
Capital Percentage Assets	50.800	-637.04	54.8807	62.03	104.78	-9.0621	87.9354	71.4551
Adjusted Capital Percentage Assets	50.800	0.9244	0.9659	0.9684	1.0031	-.9565	5.5446	0.0113
Stock βeta	50.800	-0.61	0.7408	0.72	1.97	0.1637	4.4635	0.3801

Appendix Table A2: Descriptive Statistics Dataset Two

	N	Min	Mean	Median	Max	Skewness	Kurtosis	SD
Dependent Variables								
Stock Price Effect	213.00	-0.07	0.0074	0.0023	0.125	0.9483	4.6676	0.03591
Explanatory Variables								
Human Skill Relatedness	213.00	0.00	8.9071	3.9466	76.0660	2.5630	11.4575	12.7635
Adjusted Human Skill Relatedness	213.00	-1.00	0.1960	0.5956	0.97404	-0.6838	1.7255	0.7856
Vertical Relatedness	213.00	0.00	0.1143	0.0322	0.5459	1.0798	3.0822	0.1365
Control Variables								
Total Assets	213.00	10.66	7415.078	2656.66	52521.99	2.1323	6.2025	12094.73
LN Total Assets	213.00	2.3664	7.8069	7.8848	10.8689	-0.3078	3.4305	1.6048
Firm Age	213.00	4.00	68.6854	48.00	174	0.6543	2.0913	52.1663
Return on Assets	213.00	-8.82	5.4463	4.47	27.32	1.4659	**7.6922**	5.5461
Capital Percentage Assets	213.00	32.54	59.4890	59.64	93.63	-0.2007	3.2431	13.6162
Stock βeta	213.00	0.33	0.9030	0.93	1.64	-0.0863	2.6520	0.2638

Adjustments made for normal distributed variables

Human Skill Relatedness (RSR_4d)

The human skill relatedness variable (RSR_4d) on a NACE 1.1 four digit level was made available by Neffke and Henning (2009). Based on the information in the article of Neffke and Henning (2009), this study was able to depict the degree of relatedness between activities

on a portfolio-level (primary activity vs. secondary activity) as well as on a transaction-level (primary activity of the acquiring firm vs. target activity of target firm). However, not all combinations of activities, present in the dataset, could be combined with a human skill relatedness values. This because, the measure is only defined for about 400 industry combinations on a NACE 1.1. four digit level. To make the human skill relatedness variable applicable for regression analysis, the following modification is applied:

$$\frac{(RSR\_4d-1)}{(RSR\_4d+1)} \quad \textbf{(4)}$$

By this transformation, the variable was approximately normally distributed. Formula (4), is applied to make an adjustment, given in by non-normality. Before modification, the values for the human skill relatedness variable could vary from zero till infinity. This implies that the distribution was very right tailed. After the adjustment, the observations range from minus one till one.[43]

Presence of Activity in Industrial Portfolio (Presence)

The first dataset consist of all combinations of primary and secondary industries per firm. On a NACE 1.1 four digit level, there are 508 possible combinations between the firm's primary activity and all secondary activities. The variable (Presence) depicts the occurrence of each combination in the industrial portfolio of a firm. This means that the variable will take on a value of one if an activity is present in the portfolio and zero if the activity is absent.

Mode of Industry Entry (EntryMode)

The mode of industry entry (Entry Mode) is used as dependent variable for testing the effect of relatedness on the mode of industry entry and as a control variable for assessing the effect of a transaction on the stock price of a firm. The variable takes on a value of one if a firm enters a market through Merger & Acquisition and zero if the firm enters an industry by the use of a Joint Venture.[44] The

Appendix Table B1: Entry Mode Frequency

		Frequency
1	**Joint Ventures**	17.00
2	**Mergers & Acquisitions**	196.00

[43] In addition to the adjustment, presented in Formula (4), there is excluded one outlier (235.2915) in the second dataset. This value biased the degree of human skill relatedness for a Joint Venture as mode of industry entry. However, the impact of the outlier should be minimized as it can only take on a maximum value of one.

[44] Note: Merger & Acquisition as a mode of industry entry, includes high stake partial Mergers & Acquisitions and complete Mergers & Acquisitions.

frequency, in which the two different modes of entry occur in the dataset, is depicted in Appendix table B1. Due to, among others: missing values for the stock price reaction (PE) in response to a market transaction, the dataset only includes 17 Joint Ventures and 196 Mergers & Acquisitions.

Stock Price Movement (PE)

The stock price movement (PE), which serves as a proxy for future firm performance, is depicted as a relative change between two observations in time. In this particular case, the announcement date for the transaction serves as the first moment, and the completion date as the second event in time. To calculate the movement of a stock price, the following formula is applied:

(5) $$\frac{(SP.Comp.Date - SP.Ann.Date)}{SP.Ann.Date}$$ [45]

By applying Formula (5), the stock price movement is presented as a relative change. This percentage is modeled in a linear regression model. To make this variable suitable for regression analysis, several observations were omitted from the dataset.[46]

Firm Age (Age)

To control for the experience, i.e. brand awareness and exposure of a firm, this study included Firm Age in all regression models. In order to make the information, concerning the experience of a firm, suitable for regression analysis, the following formula is applied:

(6) $$BaseYear - YearofEstablishment$$ [47]

[45] Clarification on abbreviations used in Formula (5): SP.Comp.Date is the Stock Price on Completion Date and the Stock Price on Announcement Date is presented as SP.Ann.Date.

[46] For a number of market transaction, no stock price information was available. Due to missing values, this study was not able to construct the variable Stock Price Movement for 96 market transactions. These cases needed to be omitted from the regression analysis. Furthermore, another 103 cases needed to be dropped due to a very large time span between the announcement and completion date. By dropping these observations, the effect of other market events on the stock price of the firm, is assumed to be minimized. Finally, there are dropped two observations which are remarked as outliers, one on the upper bound (14.09 percent stock price increase) and one on the lower bound (11.11 percent stock price decrease).

[47] Since all variables are based on information over the year 2009. The base year of analysis can be defined as 2009.

In addition, because of a non-normal distribution of the variable Firm Age in the first dataset, the natural logarithm was applied, to modify this variable.[48]

Primary Activity (PA1d)

To control for backgrounds and characteristics on the industry-level, this study makes use of the primary activity of a firm on NACE 1.1 one digit level. To construct this variable, the primary activity – on a NACE 1.1 four digit level - was divided by thousand and subsequently rounded off downwards. This resulted in nine possible industries, in which a firm could operate its primary activity, that were introduced as control variables.

Firm Size (LNToAs)

One of the variables in this study, which controls for effect on the firm-level, are the total assets of a firm. To work with a normally distributed variable, this variable is log transformed (LNToAs).[49]

Secondary Activities (Activities)

In this study, it is important to make a distinction between the extent and the coherence of diversification. To make this distinction, there is constructed a categorical variable, consisting of six categories, which reflects the number of secondary activities present in a firm portfolio.[50] If the firm is classified in category zero, the firm is not undertaking any secondary activities on a NACE 1.1 four digit level. In this case the industrial portfolio can be considered as undiversified. If the firm is assigned to category five, the firm is active in five or more secondary activities with a maximum of 13 activities. In the sample used for this article, 26 percent of the firms can be labeled as highly diversified, as they are assigned to category five or higher. This information can be derived from Appendix Table C1: Number of Secondary Activities.

Appendix Table C1: Number of Secondary Activities

Extent of Diversification	Frequency	Percentage
0 Activities	7	7%
1 Activities	16	16%
2 Activities	13	13%
3 Activities	24	24%
4 Activities	14	14%
5 Activities	6	6%
6 Activities	9	9%
8 Activities	4	4%
9 Activities	3	3%
10 Activities	2	2%
11 Activities	1	1%
13 Activities	1	1%
Total	**100**	**100%**

[48] For more extensive information on the distribution of this variable before and after modification: see Appendix Table A1.

[49] For more extensive information on the distribution of this variable before and after modification: see Appendix Table A1.

[50] The primary activity of the firm is omitted from the number of activities, as the primary activity, as standalone activity, does not reflect the extent to which a firm is diversified. In other words: the primary activity does not provide information on diversifying behavior of a firm.

Capital Intensity (CPA)

To control for the level of capital intensity on the firm-level, the capital percentage of assets (CPA) is introduced as a control variable. Due to a non-normal distribution of this variable in the first dataset, the variable is transformed using the following formula:

(7) $$\frac{(CPA-1)}{(CPA+1)}$$ [51]

The distribution of this variable in the second dataset did not provided ground to perform any modification.

Financial Resources Measure (ROA)

In this study, Return on Assets (ROA) is used as one of the variables to depict the relative amount of financial resources a firm possesses. Although, it was fairly problematic to modify this variable to realize a normal distribution, it was decided to apply the following formula:

(8) $$\frac{(ROA-1)}{(ROA+1)}$$ [52]

The former formula was not applied to adjust for a non-normal distribution of this variable in the second dataset. However, there were removed two outliers; one outlier on the upper bound (103.24 percent) and one on the lower bound (-30.95 percent). As can be derived from Appendix Table A2, this resulted in an approximately normally distributed variable, yet with a kurtosis of 7.6922.

Year of Completion (YearCom)

To conclude whether market trends and sentiments have any influence on the mode of industry entry and / or on the stock price reaction, this study controls for the year in which a market transaction was completed. This study includes transactions which are completed between 2000 and 2009. The second dataset included three transactions that were completed in 2010; this causes them to be omitted from the analyses.

[51] In this formula, Capital Percentage of Assets is defined as CPA. The reasoning behind the application of this formula can be considered the same as for the Human Skill Relatedness variable.

[52] As can be derived from Appendix Table A1, the variable is still suffering from a fairly high kurtosis of 13.4440 after having applied Formula (8).

Appendix B1

In Appendix Table B1 and B2 the results of the t-test on differences in means between the relatedness values, distinguished by presence, are presented.

Appendix Table B1: Two Sample T-Test (Differences in RSR Means by Presence)

Entry Mode	**Observations**	**Means**	**Std. Error**	**Std. Deviation**
Presence (0)	35.063	-0.6567	0.0031	-0.5943
Presence (1)	283.00	0.1967	0.0470	0.7907
Combined	35346	-0.6498	0.0031	0.6009
Ho: Mean (1) = Mean (0)	Ha: Mean (1) =/ Mean (0)		T-Value: -23.9870	*P = 0.0000*

Appendix Table B2: Two Sample T-Test (Differences in VR Means by Presence)

Entry Mode	**Observations**	**Means**	**Std. Error**	**Std. Deviation**
Presence (0)	50.344	0.0295	0.0002	0.0643
Presence (1)	356.00	0.1165	0.0076	0.1434
Combined	50.700	0.0301	0.0002	0.0656
Ho: Mean (1) = Mean (0)	Ha: Mean (1) =/ Mean (0)		T-Value: -25.0714	*P = 0.0000*

In Appendix Table B3 and B4 the results on the t-test on differences in means between the relatedness values for the two different modes of entry are displayed.

Appendix Table B3: Two Sample T-Test (Differences in RSR Means by Industry Entry Mode)

Entry Mode	**Observations**	**Means**	**Std. Error**	**Std. Deviation**
Joint Venture (0)	17.00	0.2753	0.1128	0.8558
M&A (1)	196.00	0.1891	0.1150	0.7812
Combined	213.00	0.1960	0.0538	0.7856
Ho: Mean (1) = Mean (0)	Ha: Mean (1) =/ Mean (0)		T-Value: 0.4329	*P = 0.6655*

Appendix Table B4: Two Sample T-Test (Differences in VR Means by Industry Entry Mode)

Entry Mode	**Observations**	**Means**	**Std. Error**	**Std. Deviation**
Joint Venture (0)	17.00	0.1442	0.0418	0.0554
M&A (1)	196.00	0.1117	0.0095	0.0929
Combined	213.00	0.1143	0.0093	0.1365
Ho: Mean (1) = Mean (0)	Ha: Mean (1) =/ Mean (0)		T-Value: 0.9505	*P = 0.3480*

Appendix Table B5 provides extensive information on the effect of the degree of related diversification, on the stock price of the acquiring firm. To examine whether the results, depicted in Descriptive Statistics Table C2 hold, the stock price movements are assigned to eight equally distributed categories. Stock price reactions vary from category zero (relatively negative reactions) to category seven (relatively positive reactions).

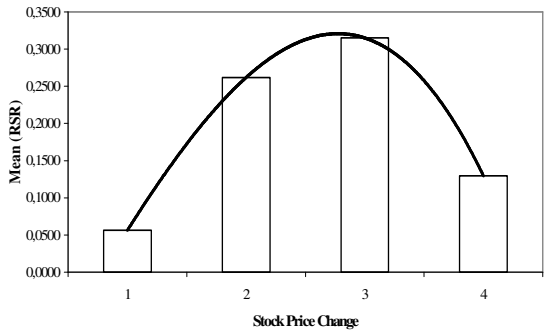
Appendix Table B5: Relatedness: An Application to Stock Price Movements

Entry Mode: Merger & Acquisition

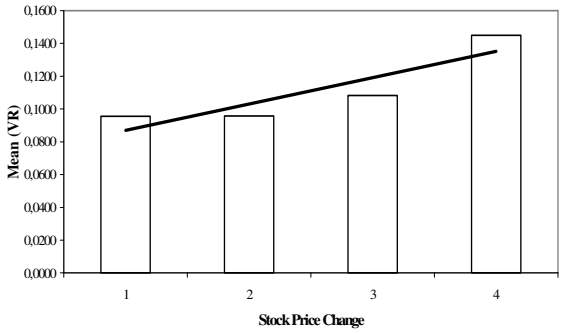
Stock Price Change	Mean(VR)	Sd(VR)	Mean(RSR)	Sd(RSR)
0	0.0991	0.1129	0.1959	0.8739
1	0.0956	0.1378	-0.0246	0.7535
2	0.0801	0.1119	0.1710	0.8232
3	0.1070	0.1617	0.2973	0.6527
4	0.1145	0.1396	0.3429	0.7485
5	0.1009	0.1186	0.2837	0.6957
6	0.1444	0.1452	0.2089	0.8137
7	0.1456	0.1269	0.0435	0.9017

Appendix Graphs B1-B4 provide detailed information on the relational pattern between related diversifications and stock price movements, for both four and eight categories. Appendix Graphs B1-B4 are constructed for Human Skill Relatedness (Graph B1 and Graph B3) and Vertical Relatedness (Graph B2 and Graph B4). Furthermore, Appendix Tables B6 and B7, provide additional information on the stock price movements which are segmented in categories. In these tables, the category mean, standard error and the number of observations in each category becomes visible.

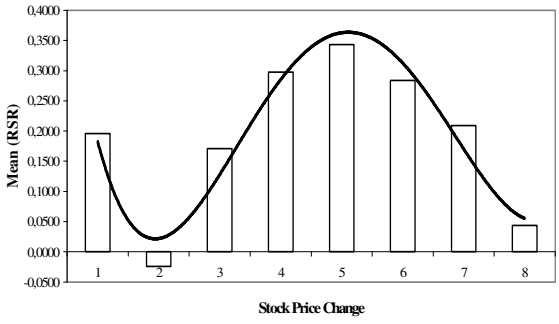
Appendix Graph B1: Human Skill Relatedness: An Application to Stock Price Movements



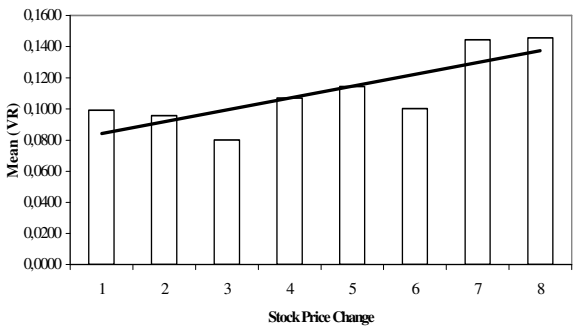
Appendix Graph B2: Vertical Relatedness: An Application to Stock Price Movements



Appendix Graph B3: Human Skill Relatedness: An Application to Stock Price Movements



Appendix Graph B4: Vertical Relatedness: An Application to Stock Price Movements



Appendix Table B6: Average Stock Price Movement (PE)

Entry Mode: Merger & Acquisition

Stock Price Change	Mean(PE)	Sd(PE)	Frequency
1	-0.0314	0.0152	48.00
2	-0.0051	0.0043	49.00
3	0.0107	0.0066	47.00
4	0.0549	0.0300	52.00
Total	0.0081	0.0363	196.00

Appendix Table B7: Average Stock Price Movement (PE)

Entry Mode: Merger & Acquisition

Stock Price Change	Mean(PE)	Sd(PE)	Frequency
0	-0.0449	0.0116	22.00
1	-0.0202	0.0049	25.00
2	-0.0093	0.0021	24.00
3	-0.0015	0.0022	26.00
4	0.0052	0.0019	25.00
5	0.0170	0.0040	22.00
6	0.0342	0.0053	27.00
7	0.0773	0.0297	25.00
Total	0.0081	0.0363	196.00

Appendix C1

Appendix Table C1: Changes in Probabilities for Presence

Different Ranges Pr(y/x) 0.9964 0.0036	Min -> Max	0 - > 1	- / + 1/2	- / + sd / 2	Marg. Effect	x	sd_x
Firm-Level Controls							
LN Total Assets	-0.0041	-0.0004	-0.0003	-0.0006	-0.0003	6.3732	2.3593
LN Firm Age	0.0022	0.0004	0.0006	0.0005	0.0006	3.6119	0.8833
Adj. Return on Assets	-0.0027	-0.0003	-0.0003	-0.0003	-0.0003	0.8062	0.9043
Adj. Capital Percentage Assets	-0.0034	-0.9969	-0.7208	-0.0005	-0.0468	0.9658	0.0110
Firm Risk	0.0064	0.0020	0.0024	0.0009	0.0023	0.7480	0.3833
Industry-Level Controls							
Dummy cat. 2	-0.0006	-0.0006	-0.0007	-0.0003	-0.0007	0.2441	0.4296
Dummy cat. 3	-0.0002	-0.0002	-0.0002	-0.0001	-0.0002	0.1511	0.3582
Dummy cat. 4	-0.0012	-0.0012	-0.0015	-0.0003	-0.0015	0.0465	0.2105
Dummy cat. 5	0.0009	0.0009	0.0008	0.0003	0.0008	0.1162	0.3205
Dummy cat. 6	-0.0014	-0.0014	-0.0017	-0.0006	-0.0017	0.1395	0.3465
Dummy cat. 7	-0.0014	-0.0014	-0.0016	-0.0007	-0.0016	0.2325	0.4224
Dummy cat. 9	-0.0032	-0.0032	-0.0088	-0.0008	-0.0074	0.0116	0.1072
Measures of Portfolio Coherence							
Adj. Human Skill Relatedness	**0.0337**	**0.0273**	**0.0031**	**0.0031**	**0.0051**	**-0.6493**	**0.6011**
Vertical Relatedness	**0.0759**	**0.5472**	**0.0013**	**0.0013**	**0.0213**	**0.0267**	**0.0600**

Appendix D1

From the regression results depicted in Results Table A2, it can be derived that none of the control variables, apart from the Firm's Total Assets, are significant on a ten percent level *(p>0.10)*. To estimate whether the results differ, when regressing without the insignificant control variables, this analysis is only performed for the significant control variable and the relatedness variables. The outcomes from this regression are depicted in Appendix Table D1.

Appendix Table D1: Relatedness: An Application to Industry Entry

Logit Model	(1)	(2)	(3)
Firm-Level Controls			
LN Total Assets	-0.5024 ***	-0.5063 ***	-0.5001 ***
	(0.1763)	(0.1776)	(0.1763)
Firm Risk	1.2460	1.2422	1.4431
	(1.0149)	(1.0104)	(1.0350)
Measures of Firm-Market Relatedness			
Adjusted Human Skill Relatedness		-0.1873	-0.1586
		(0.3523)	(0.3535)
Vertical Relatedness			-1.7601
			(1.7002)
Constant	5.5355 ***	5.6144 ***	5.6044 ***
	(1.8516)	(1.8701)	(1.8514)
Log Likelidhood	-53.7633	-53.6174	-53.103676
Psuedo R-Square	0.0931	0.0955	0.1042
Number of Observations	196.00	196.00	196.00

* significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Appendix E1

To provide an indication on the multicollinearity, which might be present in the linear estimation model, the VIF values are presented in Appendix Table E1. As can be derived from this table, the VIF values are ranging from 1.26 till 5.64.

Appendix Table E1: VIF Values Linear Model (4)

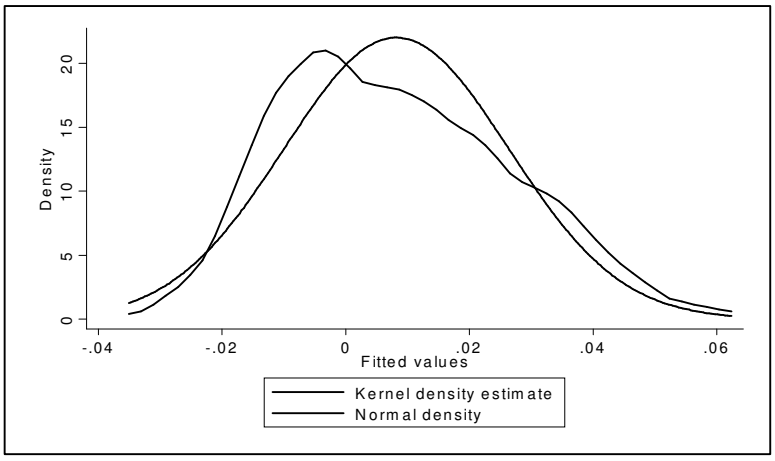
Variable	VIF	1/VIF
Industry Dummy Cat. 7	5.64	0.1772
Industry Dummy Cat. 2	4.48	0.2230
Industry Dummy Cat. 6	2.90	0.3444
Industry Dummy Cat. 3	2.73	0.3666
LN Total Assets	2.73	0.3666
Firm Age	2.68	0.3731
Capital Percentage Assets	2.03	0.4927
Industry Dummy Cat. 5	1.89	0.5285
Industry Dummy Cat. 4	1.64	0.6082
Vertical Relatedness	1.52	0.6565
Return on Assets	1.35	0.7380
Firm Risk	1.35	0.7413
Human Skill Relatedness	1.26	0.7924
Mean VIF	**2.48**	

Appendix Table E2 and Appendix Graph E1 provide extensive information on the distribution of the residuals, concerning the fourth model of the third regression analysis. The skewness and kurtosis values depicted in Appendix Table E2, and the figure in Appendix Graph E1, provide support for a normal distribution of the residuals.

Appendix Table E2: Normal Distribution of Residuals Linear Model (4)

	N	Mean	Variance	Largest SD	Skewness	Kurtosis
Dependent Variable Hypothesis Three						
Stock Price Effect	196.00	6.80e-11	0.0011	0.0343	0.5442	3.8772

Appendix Graph E1: Normal Distribution Residuals (Kdensity)



Appendix Table Table E3 provides detailed information on the composition of the dummy variable for the adjusted Human Skill Relatedness measure. As can be derived from Appendix Table E3, the first dummy category consists of 53.00 adjusted Human Skill Relatedness values between -1.00 and -0.33. The second dummy category includes 24.00 observations between -0.33 and 0.33. The third and final dummy category consists of 119.00 Human Skill Relatedness values, which vary from 0.33 till 1.00.

Appendix Table E3: Human Skill Relatedness Dummy

Adjusted Human Skill Relatedness Variable (-1.00 - 1.00)

RSR(Cat.)	Category Interval	Frequency
1	-1.00 till -0.33	53.00
2	-0.33 till 0.33	24.00
3	0.33 till 1.00	119.00

In Appendix Table E4, the results concerning a t-test on differences in means, between the dummy categories regressed in Model (6) of the linear regression analysis, are presented.

Appendix Table E4: F-Test (Differences in Means between Dummy Categories)

1	Human Skill Relatedness	Dummy 1 = 0
2	Human Skill Relatedness	Dummy 3 = 0
F(2,179) = 1.60	**Prob > F = 0.2052**	