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**ASSET SPECIFICITY AND BEHAVIORAL UNCERTAINTY AS MODERATORS OF  
THE SALES GROWTH—EMPLOYMENT GROWTH RELATIONSHIP IN  
EMERGING VENTURES**

**ABSTRACT**

Sales growth and employment growth are the two most widely used growth indicators for new ventures; yet, sales growth and employment growth are not interchangeable measures of new venture growth. Rather, they are related, but somewhat independent constructs that respond differently to a variety of criteria. Most of the literature treats this as a methodological technicality. However, sales growth with or without accompanying employment growth has very different implications for managers and policy makers. A better understanding of what drives these different growth metrics has the potential to lead to better decision making by these managers and policy makers. To improve that understanding we apply transaction cost economics reasoning to predict when sales growth should be or should not be accompanied by employment growth. Our results indicate that these predictions are borne out consistently in resource-constrained contexts but not in resource-munificent contexts.

## **Executive Summary**

New venture growth is a central topic in entrepreneurship research. Although sales growth is emerging as the most commonly used measure of growth for emerging ventures, employment growth has also been used frequently. Sales growth and employment growth are different dimensions of growth that respond differently to a wide variety of criteria (Baum, Locke & Smith, 2001; Delmar, Davidsson and Gartner, 2003). This is also demonstrated by very low to moderately sized correlations between the two (Davidsson, Delmar, and Gartner, 2003; Weinzimmer, Nystrom, and Freeman, 1998). In this study we use transaction cost economics (Williamson, 1996) as a theoretical base to examine transaction cost influences on the addition of new employees as emerging ventures experience sales growth.

We theorize that transaction cost economics variables will moderate the relationship between sales growth and employment growth. We develop and test hypotheses related to asset specificity, behavioral uncertainty, and the influence of resource munificence on the strength of the sales growth/employment growth relationship. Asset specificity is theorized to be a positive moderator of the relationship between sales growth and employment growth. The behavioral uncertainty associated with adding new employees is hypothesized to be a negative moderator of that relationship. We also hypothesize that resource scarcity will strengthen those relationships.

We test our hypotheses in a sample of 1357 emerging firms that registered first sales in Sweden in 1994. The data were collected in four waves, with the final data collection occurring in 2004. We used confirmatory factor analysis and Cronbach's alpha scale analysis to provide evidence to support the reliability and validity of our measures. We used moderated hierarchical regression analysis to test our hypotheses.

Our results are generally in line with our hypotheses. Analyzing the entire sample and the resource scarce sub-sample, each of our hypotheses is supported by the analysis. The increases in  $R^2$  are all significant at the .05 level. When resources are abundant the interactions become insignificant, except for the case of difficulty of measuring performance which is significant in the direction hypothesized. In addition we conducted a Z-test substantiating the difference between effect sizes for the resource scarce and resource munificent groups. In all six cases there are strongly significant differences ( $p < .001$ ). The results consistently show that young and small firms tend to choose solutions consistent with the predictions of transaction cost economics when financial resources are scarce, but are less likely to do so when financial resources are relatively more abundant.

Our findings have both theoretical and practical implications. Transaction cost theory predicts that if emerging ventures increase their sales, they will be either more or less likely to support that growth by adding employees depending on the transaction costs inherent in the employer/employee relationship (Williamson, 1985, 1996). That position is supported by our results. Transaction cost theory is presented as a resource neutral theory. In contrast, our results, coupled with those of Coles and Hesterly (1998) suggest that resource munificence or scarcity significantly influences the strength of the transaction cost influences. From a practical perspective our results indicate that emerging firms add new employees in accordance with the predictions of transaction cost economics under resource constrained situations but are less likely to do so in resource abundant situations. Awareness of this tendency can help practitioners more clearly evaluate the employment decision. For policy-makers our results refine our understanding of why the firm level pursuit of growth as measured by sales often does not translate into increased employment. If employment growth is a desired societal outcome, policy

makers may focus on reducing the political and administrative hassles associated with creating and expanding employment.

## INTRODUCTION

Firm growth is an important research topic in economics, strategy, and entrepreneurship. It is of interest to scholars for many reasons; however, the most often cited is that it has a fundamental impact on the performance of economies through the introduction of new products and the creation of new markets (Shane & Venkataraman, 2000), the generation of new jobs (Birch, 1979), and regional or national economic growth (Thurik & Wennekers, 2004).

In this paper, we focus specifically on the growth of emerging ventures. Most of the new venture growth research is contained in two streams. The first, and more prevalent of the two, is *why* some ventures grow while others do not (Gilbert, McDougall & Audretsch, 2006). Researchers have examined this question at the individual level (Bird, 1989; Baum et al., 2001; Chandler & Jansen, 1992; Wiklund & Shepherd, 2003), the firm level (Edelman, Brush & Manalova, 2005; Chandler & Hanks, 1994; Dess & Davis, 1984), and the environmental level (Dess & Beard, 1984; Ensley, Pearce & Hmieleski, 2006; McDougall, Robinson & DeNisi, 1992). Overall, the results suggest that factors from each of these levels of analysis are associated with new venture growth.

The second stream of venture growth research examines *how* firms grow and the internal consequences of growth (e.g. Hanks, Jansen, Watson & Chandler, 1993; Kazanjian & Drazin, 1990; McMahon, 2001). In this stream of research firm growth is assumed to be present, but there is no strong theoretical reason explaining why firms grow. Rather, it seeks to describe the processes associated with growth. Our research fits best within this latter stream of research. We do not attempt to predict firm growth, but rather whether employees will be added to support

sales growth or whether sales growth will be supported by external contracting or other activities. For example, instead of adding permanent employees, an emerging company might subcontract for workers or with an existing manufacturer to produce its product. Alternatively, it might it might acquire technology and equipment to replace workers. Our integration of transaction cost economics provides a theoretical rationale for choosing to add permanent employees rather than choosing other solutions and thus makes a novel and significant contribution to the literature.

Research focusing on *why* firms grow is frequently limited because only survivors are studied. This restricts the response range and may produce misleading inferences about differences between firms that grow and those that don't, since many that don't grow are eliminated from the sample. However, that criticism does not apply equally to the study of *how* firms grow. In the introduction to her classic theory of the growth of the firm, Penrose (1959) acknowledges the tautological problem (survivor bias) associated with studying only growing firms when studying *why* firms grow. However, she points out that the study of defunct firms can not inform us with regards to *how* firms grow. Penrose (1959) argued that she was not asking what determines whether a given firm can grow, but rather assuming that some firms can grow, she asked what principles govern their growth? She concluded by stating that although their analysis was concerned only with growing firms, it did not create circular reasoning. We believe Penrose's rationale also applies to our study. We are not studying *why* firms grow, but rather analyzing the relationship between sales growth and employment growth. Consistent with Penrose's reasoning, the study of failed firms does not inform that process.

Despite significant research interest concerning both the *why* and the *how* of firm growth, empirical results regarding those factors associated with growth are mixed (Davidsson &

Wiklund, 2000; Weinzimmer et al., 1998; Delmar, 1997). This may have occurred because growth measures including changes in sales and employment have been used somewhat interchangeably (Ardishvili, Cardozo, Harmon, & Vadakath, 1998; Delmar, 1997; Weinzimmer et al., 1998; Wiklund, 1998). Although many studies have used sales and employment change as indicators of growth, in the few that reported correlations between sales growth and employment growth indicators, the correlations were relatively small, ranging from .09 in a sample of small firms (Davidsson et al., 2003) to .57 in a sample of publicly traded firms (Weinzimmer et al., 1998). Thus, sales growth and employment growth are correlated, but not equivalent measures of venture performance. For example in Delmar et al., (2003) some categories of “high sales-growth firms” did not expand at all in terms of employment.

The central premise of this paper is that sales growth and employment growth are not interchangeable measures of new venture growth. Rather, they are related, but largely independent constructs that respond differently to a variety of criteria (Weinzimmer et al, 1998). For example, policy makers generally view employment growth as an indicator of a healthy economy (Birch, 1979; Birch & Medoff, 1994; U.S. Small Business Administration, 2001; Zacharakis, Neck, Bygrave & Cox, 2001), yet managers of emerging firms often have more ambivalent attitudes towards expanding the work force (Delmar & Davidsson, 1999; Sapienza et al., 2003). Employment growth appears to be a particular dilemma for independent business owner-managers as it is associated with both desirable and undesirable expected consequences (Wiklund et al., 2003). For the managers of emerging ventures, the hiring of employees is often associated with opportunities to expand, gain market share, and provide employment. However, it may also be associated with considerable cost, risk, and administrative hassle. As a result

founders of new ventures may choose not to pursue growth or alternatively pursue growth only when it can be done without assuming the responsibility for additional employees.

Therefore, the relatively small reported correlation between sales and employment growth in emerging ventures is not merely a technical issue that is solved by choosing the supposedly more appropriate indicator. If a new venture's sales growth is not accompanied by employment growth in the same organization, it has important implications for management and policy-makers alike. A focus only on sales growth neglects the possible societal benefit of increased employment (which may not result if owner-managers refrain from growth that can only be achieved if employment is also increased, or which may appear in sub-contracted organizations in other regions or nations).

There is a dearth of theory-based research that more closely analyzes the relationship or lack of relationship between sales growth and employment growth. For these reasons, we seek to address the following question: *When is it reasonable to assume that employment growth should be associated with sales growth?* We make a unique contribution by using transaction cost economics (Williamson, 1996) to provide a theoretical rationale to explain under which conditions employment growth should accompany sales growth. Our research shows that venture founders make choices to increase employment consistent with the predictions of transaction cost economics when constrained by scarce financial resources. In addition, we make a contribution to practitioners at both policy-making and management levels. The question of under what conditions it is possible to successfully grow in sales without or with only limited employment growth is a pertinent issue given business founders' documented reluctance to expand the workforce. Finally, we contribute to the transactions cost literature by applying the



theory to the domain of new venture growth and by testing the theory's applicability across environments that vary in the scarcity or abundance of financial resources.

Using transaction cost economics (Williamson, 1996) as a theoretical background we derive testable hypotheses about the relationship between sales growth and employment growth. These hypotheses are tested in a large sample of Swedish firms that registered first sales in 1994 and have been tracked during their first decade of existence. We then summarize our results and discuss their implications.

### **THEORETICAL PERSPECTIVE**

There are a variety of reasons why managers of firms with sales growth potential choose to add or not to add new employees. Evidence suggests that in industry specific sectors there is a significant amount of job creation, destruction, and reallocation (Davis & Haltiwanger, 1992). Indeed, in many cases, sales growth may be supported by advanced technology and equipment rather than the addition of employees or subcontracting for services (Dunne et al., 1996). However, the purpose of the current study is not to explain all discrepancies between sales growth and employment growth, but rather to show that transaction cost economics (Williamson, 1996) provides a theoretical rationale explaining part of the shared variance in the relationship between sales growth and employment growth.

According to the transaction cost perspective (Williamson, 1996), the benefits of having a larger organization and hierarchy always come at a cost. In the framework of our study, employment growth is unlikely to occur unless sales and cash flows grow sufficiently to support employment expansion. However, even when sales are growing, it may or may not be desirable or feasible to add new employees. Whenever a transaction is transferred from an external market

to an internal organization function there are increased bureaucratic costs that may outweigh the efficiencies gained through such a transfer. In addition, the incentives to the individual decision maker are degraded as organizations become larger and necessarily more bureaucratic. Transaction cost economics predicts that under some conditions, it is more efficient for managers in growing firms to add employees internally, while in others it is more efficient to contract externally. In the current research, we focus on two aspects of transaction cost economics: (1) asset specificity, and (2) behavioral uncertainty. These constructs have been shown in previous research to be related to the decision to grow sales concurrently with adding employees to the company structure (David & Han, 2004). Based on a review of the transaction costs literature that has sought to measure the relevant transaction cost variables (e.g. Rindfleisch & Heide, 1997; Anderson, 1985) we focus on four specific aspects of human asset specificity and two aspects of costs associated with behavioral uncertainty. In the following section we hypothesize their moderating affect on the relationship between sales growth and employment.

### **Asset Specificity**

Williamson (1985) argues that a major force that drives the decision to add employees to the firm is the specificity of skills and abilities required. From a transaction cost perspective the more specific the inputs required in the firm's production process, the less likely these products or services will be satisfactorily available from the market. As the specificity of required human assets increases it influences firms to integrate by adding employees to support growth rather than engage in external contracting (David & Han, 2004). In addition, when assets are either not specific or cease to be specific, tasks that were formerly performed by employees are likely to be outsourced or disintegrated (Hesterly, Liebeskind & Zenger, 1990). Thus, as firms experience growth in sales, they may support that growth by adding employees, subcontracting externally,

or using technologies that require fewer employees. Transaction cost economics provides a reasonable explanation of the moderating influence of human asset specificity on the relationship between sales growth and employment growth.

***Firm specific knowledge and product specific knowledge.*** Anderson (1985) identifies the amount of firm specific knowledge and the amount of product specific knowledge as two separate dimensions of human asset specificity. If either extensive searching to find capable employees or extensive training is required to get an employee up to speed with respect to products, services, and customer relationships, it requires an upfront commitment of time and energy and often money on part of the entrepreneur and management team that is not likely to pay off for some time in the future (Pfeffer, 1998). Related to the training for the firm's products, services, and customer relationships is the training associated with a new employee getting up to speed with the internal practices, policies and procedures. The investment in training and socializing new employees may be lost if the employee does not stay with the firm for an extended period of time (Bac, 2000; Benson et al., 2004). Hence, there is likely to be an emphasis on recruiting and hiring employees under a long time window, which suggests somewhat permanent rather than temporary employment arrangements.

***Hypothesis 1:*** *The degree of product specific knowledge required for new employees is a positive moderator of the relationship between sales growth and employment growth.*

***Hypothesis 2:*** *The degree of firm specific knowledge required for new employees is a positive moderator of the relationship between sales growth and employment growth.*

***Importance of excellent personalized service.*** The degree to which firm success depends on excellent customized service introduces another type of human asset specificity. This construct is relevant when personal relationships count, the identity of the person that provides

the customer's contact point with the company matters to the customer, and the nature and quality of the interaction between employees and customers is relevant (Anderson, 1985). Thus, for companies in which personalized service matters there is an expectation that employees will be brought within the firm. This provides a greater opportunity to recoup the costs associated with screening and monitoring performance.

***Hypothesis 3:** The degree to which personalized customer service matters is a positive moderator of the relationship between sales growth and employment growth.*

***Necessity of maintaining proprietary information.*** An emerging firm can build a competitive advantage because of proprietary information not possessed by other companies. In fact, specialized intellectual or technical resources may provide a sustainable source of competitive advantage (Barney, 2001). For a small firm, adding employees exposes the proprietary knowledge of the company to opportunistic hazards because of the temptation of some employees to pursue self-interests (Zeng & Chen, 2003), yet opportunistic hazards are expected to be less for permanent employees than for temporary employees or subcontractors. Thus, the more proprietary information needs to be shared with employees in order to allow the firm to run successfully, the greater the likelihood that permanent employees will be added.

***Hypothesis 4:** The importance of maintaining proprietary information is a positive moderator of the relationship between sales growth and employment growth.*

### **Behavioral uncertainty**

Behavioral uncertainty arises from the difficulties associated with assuring the performance of exchange partners (Williamson 1985). According to Rindfleisch and Heide (1997) most studies conceptualize behavioral uncertainty as an issue of making sure the expected performance occurs (Heide & John 1990), whether it is completed by regular employees or by

temporary or contract workers. The behavioral uncertainty associated with the performance of regular employees or contract workers can take on two forms. The first form of behavioral uncertainty involves screening, hiring, and supervising employees. Although research indicates that more rigorous screening, hiring, and supervising polices are likely to lead to better performance (Koch & McGrath, 1996), it requires an upfront expenditure by the employer, with no guarantee of a payoff. The second form of behavioral uncertainty is associated with accurate measurement of performance. Several studies have focused on the behavioral uncertainty associated with assessing performance (e g., John & Weitz 1989; Stump & Heide 1996; Weiss & Anderson 1992).

***Amount of screening and supervision required.*** Costs accrue when it is difficult to screen potential employees and when the control of work processes requires substantial supervision. These internal transaction costs represent immediate cost outlays for firms. Small and young firms often operate in a resource strapped mode and payoffs from such hiring may require some time to develop. Therefore, consistent with the predictions of transaction cost analysis (Williamson, 1996) as the amount of screening and supervision increases, it discourages employment and leads to a greater likelihood of supporting sales growth through methods such as subcontracting or outsourcing, rather than employing permanent employees. If temporary employees are used, the screening function shifts to the agency. Hence, screening costs apply more specifically to permanent employees.

***Hypothesis 5:*** *The difficulty of screening and supervising employees is a negative moderator of the relationship between sales growth and employment growth.*

***Difficulty of measuring employee performance.*** Behavioral uncertainty and potential hazard costs exist when it is difficult for a manager to determine how well an individual is

performing. This occurs when much of the work occurs at a team level, outcomes are difficult to measure, or measurable outcomes do not reflect adequate performance (Anderson, 1985). In such a setting, workers can take advantage of the organization by not performing adequately and poor performance is likely to go undetected. These opportunistic hazards exist for permanent employees, yet they are expected to be greater for temporary employees or subcontractors. Permanent employees are more likely to be influenced by culture and organizational norms, even when performance is hard to measure. In such a setting, permanent employees would be preferred over temporary employees or subcontracting. Thus, if performance is difficult to measure it is a positive moderator of the relationship between sales growth and employment.

***Hypothesis 6:** The degree to which it is difficult to measure employee performance is a positive moderator of the relationship between sales growth and employment growth.*

### **Contextual Factors**

Coles and Hesterly (1998) explain that transaction cost explanations are subject to contextual factors. In their research the predictions of transaction cost economics were valid in a sample of for-profit hospitals, but not so in a sample of not-for-profit hospitals. They conjectured that the difference in results stemmed from less pressure to perform in market efficient ways in the not-for-profit hospitals. In general, the transaction cost approach is presented as resource neutral with an underlying assumption that firms will make market efficient decisions. However, firms with abundant resources have no immediate pressures to perform in market efficient ways. The perceived risks involved in making a “wrong decision”, including failure, are less in more munificent environments (Yasai-Ardekani, 1989; Baum & Wally, 2003). Risk-averse actions, including actions that allow firms to maintain more control over potential losses, are therefore more likely in situations of resource scarcity (Singh, 1986). The munificence of the task

environment (Castrogiovanni, 1991) is therefore thought to moderate the relationship between human asset specificity and behavioral uncertainty on the one hand, and employment in emerging firms on the other. When financial resources are readily available, there is decreased pressure to operate in accordance with the predictions of transaction cost economics.

***Hypothesis 7:** In resource munificent environments the moderating effect of transaction cost variables is significantly weaker than will be encountered in resource scarce environments.*

## **METHODS**

### **Sample**

This study employs a unique and well-developed data set. The sample frame for this study was a panel with an original size of 7256 new firms. The panel was created using a stratified random sample of all new business registrations in Sweden during 1994, representing 30% of the entire target population. The sample covers the full spectrum of industries, with the exception of agriculture, and thus provides a representative indicator for sales and job creation in new businesses in Sweden. Since inception, we systematically surveyed the panel using telephone and mail surveys in 1995, 1998, and 2000. As the first two waves were in part mandatory surveys by a Government agency response rates were exceptionally high; well above 90% of eligible firms. By the end of 2000, 42.8% (N= 3048) of the firms were no longer active and 2.9% (N= 210) of the firms were missing data. A number of firms had also requested to not be contacted again. In the fall of 2003 we sent an additional survey to the remaining 3451 firms that had continued to report sales through to the end of 2000. We received 2021 responses following two reminders; a response rate of 59%. This is a very positive response, especially considering that a substantial number of non-responding firms are likely to have gone out of

business (potentially due to recession in the global economy) and/or moved without leaving a forwarding address during the three years since last contact. Of the 2021 responses, 1357 had sufficient information across all waves of data collection for our analyses. The mean size of the firms involved is slightly over 5.1 full-time equivalent employees (with standard deviation 55.9). The mean sales was 2,100,000 SEK in 2003 (during the time period of the study the exchange rate ranged between 6.6-10.6 SEK per 1 \$US). We compared the 2003 means to those in 2000 in which mean size of the firms was 1.8 FTE (standard deviation 2.79) and 866,000 SEK in mean sales. This indicates that average sales and employment growth increased significantly between the 2000 and 2003 surveys.

Sweden is characterized by comparatively strict employment security legislation as well as by wage setting institutions leading to a compressed salary span (Henrekson, 2005; Henrekson & Johansson, 1999; Henrekson & Rosenberg, 2001). On the one hand, this may make it a suitable context for testing our theory-based hypotheses. On the other hand, it may mean that the tendency for employment and sales growth to move together is weaker than in, e.g., the US.

## **Measurement**

***Dependent Variable.*** The dependent variable is the change in employment. This is particularly relevant for this study because of our predictions that employment growth is more likely to accompany sales growth when human assets are highly specific and less likely to accompany sales growth when the costs associated with behavioral uncertainty costs are high. In addition, many studies of new venture performance use employment growth as an important indicator (Baum, Locke & Smith, 2001; Chandler & Hanks, 1993). In the 1995, 1998, 2001 and 2004 questionnaires respondents were asked to tell us the number of employees working less



than 10 hours, from 10-35 hours, and 35 or more hours. Employees working ten hours or less were computed as  $\frac{1}{4}$  FTE (Full-time equivalent), employees working between 10-35 hours were computed as  $\frac{1}{2}$  FTE and employees working 35 or more hours were computed as 1 FTE. Although the preferred exact formula to use is debated (Delmar, 1997; Davidsson & Wiklund, 2000; Weinzimmer et al., 1998), we believe our aggregation to represent a reasonable approximation of employment. We calculate the change in employment as the difference between 2004 and 1995 levels, which results in a skewed distribution with extreme outliers. To avoid having a small number of cases drive the results we trimmed the most extreme outliers and used a natural log transformation. The natural log transformation affects large values more than small values, and is a frequently used and time honored method to improve the characteristics of the distribution with regards to the assumption of normality inherent in ordinary multiple regression (Box & Cox, 1964). To control for the influence of initial start size, we used the number of FTE employees in 1995 as a control variable. The start date of each company in the sample is controlled by the study design because all companies started in 1994.

***Sales Growth.*** We test the relationship between sales growth and employment growth. Sales growth has been widely accepted as an important indicator of emerging venture performance (Chandler & Hanks, 1993; Davidsson & Wiklund, 2000; Delmar, 1997; Robinson & McDougall, 2001; Weinzimmer et al., 1998). Sales data were available through government sources for each year of the study. Sales growth in this study is the slope of the sales regression line over time. Because the distribution is skewed we employ a natural log transformation.

***Moderating variables.*** To develop the items measuring asset specificity and behavioral uncertainty, we followed the guidelines set out by Robinson et al. (1991). We developed multiple item asset specificity scales following the theoretical components first set out by Williamson

(1985) and amended these issues with later theoretical advances. This task was simplified by the fact that both Anderson (1985) and Rindfleisch and Heide (1997) discussed scales for measuring human asset specificity and behavioral uncertainty. Using these scales as prototypes, we added items and modified items to be appropriate for use in a sample of start-up firms. We initially rendered the items in English. The items were translated into Swedish by a native speaker. Another native speaker with extensive research experience double-checked the items. A team of native English and Swedish speakers then re-translated the items into English and they were checked against the original items. Additionally, we pre-tested the survey with ten local businesses from different industries in order to verify item relevance and respondent understanding across a variety of contexts.

We measured asset specificity and behavioral uncertainty variables using five-point Likert type scales. We analyzed item measures using confirmatory factor analysis (CFA). We employed a several goodness of fit measures in order to assess the fit of the six factor model. The results for the CFA are presented in Table 1. The six factor model suggested by theory is superior to the null single-factor model (as well as 2, 3, 4 and 5 factor models). In this case the value of the root mean square error of approximation (RMSEA) in the six factor case is .042; values of less than .05 for RMSEA indicate good model fit (Byrne, 2001), while values as high as .08 may represent reasonable errors of approximation in the population (Browne & Cudeck, 1993). The adjusted goodness of fit index (AGFI) is .95 and indicates good model fit (Byrne, 2001). We also employed two comparative indices, the comparative fit index (CFI) and the incremental index of fit (IFI). The values of both indices are .96, once again indicative of good fit (Hu & Bentler, 1999). We did not employ the chi-square likelihood ratio test because of its sensitivity to large sample sizes (MacCallum et al., 1996; Bagozzi et al., 1991).

We assessed the internal consistency of each of the newly formed constructs. Reliabilities range from .69 to .90. Nunnally (1978) recommends that for decisional purposes alphas should be greater than .70; however, for research purposes, .60 may be adequate. Thus, for the purposes of this paper, measures of all of these constructs meet his recommendations.

Four scales measure asset specificity: product specific knowledge, firm specific knowledge, importance of customer relationships, and importance of maintaining proprietary information. The appropriateness of each construct was discussed and justified in the theory and hypothesis development section of the paper. The full text for each item is included in table 1.

Insert Table 1 About Here

***Product specific knowledge*** is intended to measure the time and energy required for a new employee to gain sufficient knowledge about the products and services offered to work effectively. It is measured using a four item scale. Key items reference the time and effort required for a new employee to gain adequate product expertise, achieve the ability to operate independently, and understand the details of the company's products. Coefficient alpha for the scale is .85.

***Firm specific knowledge*** is intended to measure the time and energy required for a new employee to gain sufficient knowledge about the internal operations of the business to work effectively. The specific statements in this three item scale focus on the time and energy required for new employees to learn specific company practices, how the business works, and the rules and procedures they are expected to follow. Coefficient alpha for the scale is .80.

***The importance of customer relationships*** is intended to measure how important employee/customer relationships are for the success of the business. Such relationships became asset specific because it takes substantial time and energy to develop such relationships. This variable is measured using a four item scale. Example items include the importance of employees understanding customer needs, developing loyalty between customers and specific employees, and forming cooperative working relationships. Coefficient alpha for the scale is .82.

The ***importance of maintaining proprietary information*** is the fourth measure of asset specificity included in our study. It is intended to measure how important it is for employees to know and maintain proprietary information. It is measured by a three item scale that includes items referencing the necessity of giving proprietary information to employees regarding products, procedures and practices. Coefficient alpha for the scale is .90.

The remaining items were intended to measure the costs associated with the behavioral uncertainty of hiring employees. The ***difficulty inherent in screening and supervising*** employees is measured by a five item scale. Key items for the scale focus on issues such as the uncertainty in knowing whether or not an employee will turn out to be good or bad, the costs associated with dismissing an employee that doesn't live up to expectations, and the cost in time and money of supervising employees. Coefficient alpha for the scale is .69.

Our final scale in this section assesses the ***difficulty of measuring performance***. This construct is measured using a two item scale. As can be seen in Table 1, the items are pretty straightforward statements directly addressing the 'label' of this construct. Coefficient alpha for the scale is .71.

While sales growth and employment growth variables were measured at multiple times throughout the study, asset specificity and behavioral uncertainty variables were measured in 2004. The validity of this approach requires an assumption that differences among firms on variables such as the importance of firm specific knowledge, building and maintaining customer relationships, and the difficulty of measuring employee performance are relatively stable over time. While this is a reasonable assumption as long as firms do not completely change tracks as regards what industry they operate in is also an admitted weakness of our design.

In addition to the asset specificity and behavioral uncertainty variables, we hypothesized that *resource munificence* would be a moderating contextual variable. Resource munificence is the scarcity or abundance of resources a firm has access to (Castrogiovanni, 1991). Prior research has shown resource munificence to influence transaction cost impacts (Coles and Hesterly, 1998). Because financial resources are often substitutable for other forms of resources (Chandler and Hanks, 1998), we focused specifically on the availability of financial resources. Resource munificence is measured using a 2-item scale referencing the availability of financial resources. Coefficient alpha for the scale is .86.

**Controls.** Because of the large sample size we were able to control for industry differences. We used dummy variables for 26 industries with 15 or more companies represented per industry as determined by the Swedish industrial classification system (similar to SIC codes in the U.S). We aggregated twenty of these at the 5-digit industry code, while 6 remaining industries were aggregated at the 2 digit level. We chose this approach rather than aggregating all industries into 2 digit codes because we believe industry differences may be obscured by excessive aggregation. These industries accounted for 71% of the companies. We categorized the remaining companies as “other” (these were industry codes with fewer than 15 companies at the

two digit level) and used them as the hold-out group in the regression analysis. We also controlled for the initial size (number of full time equivalent employees).

In table 2 we report descriptive statistics and correlations for the key independent and dependent variables in the study. Of particular note, our measures of sales growth and employment growth are correlated only at the .22 level. That suggests that only about 5% of the variance in employment growth is explained by employment growth. This suggests that although there is some relationship between the two, that they are not jointly determined. A Durbin-Wu-Hausman test of endogeneity as described by Davidson and McKinnon (1993) was performed to assess the appropriateness of the OLS model. The results of this test (available from the authors) supports the use of OLS regression to estimate our models. The transaction cost variables are only modestly correlated with each other, with product specific knowledge and firm specific knowledge being the most strongly correlated at  $r=.58$  ( $p<.001$ ). As might be expected the interaction terms are significantly and strongly correlated with the variables from which they are composed. For example, the interaction of product specific knowledge\*sales growth is correlated at the .99 level with product specific knowledge. Southwood (1978) suggests mean centering variables before computing the interaction term to reduce the degree of collinearity. In the correlation matrix we report the uncentered interaction term on the left and the centered interaction on the right. The signs on the uncentered terms are consistent with intuitive expectations. After centering, the correlations among variables are substantially lower, consistent with Southwood (1978) and the signs on the centered interaction terms are sometimes negative because they were centered.

Insert Table 2 about here

## **ANALYSIS AND RESULTS**

We use hierarchical linear regression analysis to test the moderating influence of asset specificity and behavioral uncertainty. We enter industry membership as a block to control for industry differences. The industry variables explain approximately 5% of the variance in the full sample; about 12% in the sub-sample of firms reporting scarce financial resources, and 6% of the variance in the sub-sample of firms reporting abundant financial resources.

The second block included initial employment size as a control variable, sales growth and each of the asset specificity and behavioral uncertainty variables in turn. Our hypotheses focused on the moderating influence of asset specificity and behavioral uncertainty. Venkatraman (1989) suggests that this form of moderation can be successfully modeled as an interaction. Thus, in the third block we entered the interaction terms: (1) sales growth \* product specific training, (2) sales growth \* firm specific training, (3) sales growth \* importance of customer relationships, (4) sales growth \* importance of trade secrets, (5) sales growth \* screening and supervision required, and (6) sales growth \* difficulty of measuring performance. We estimated the models in separate equations because each interaction term shared the sales growth component which resulted in high levels of multicollinearity.

Because of the size of the sample we were able to model the moderating influence of financial munificence by splitting the sample, which is an appropriate way to show that predictive ability of a variable differs across different environments (Venkatraman, 1989). The median and mode of the financial munificence variable was 3.0, with 383 companies represented at that value. We used a decision rule “larger or equal to the median” as the cutoff, resulting in 481 firms in the resource scarce subgroup and 876 firms in the resource munificent subgroup.

Some of the regressions were done with slightly smaller sample sizes because of missing data for independent variables. Results are displayed in Table 3.

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Insert Table 3 about here  
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All of our hypotheses are supported by the analyses for the full sample and for the resource scarce sub-sample. Each investigated aspect of asset specificity and behavioral uncertainty costs influences the relationship between sales growth and employment as hypothesized. Although these relationships are significant, the effect sizes are relatively small.  $f^2$  is the appropriate effect size measure to use in the context of an F-test for multiple correlation or multiple regression. The effect size measure for multiple regression is defined as:

$$f^2 = R^2 / 1 - R^2$$

By convention,  $f^2$  effect sizes of 0.02, 0.15, and 0.35 are considered small, medium, and large, respectively (Cohen, 1988). Effect sizes for statistically significant results are also displayed in table 3.

When resources are abundant the interactions become insignificant, except for the case of product specific knowledge which remains significant in the opposite direction. Note that we conservatively made the resource munificent group the larger one, so the lack of significant results for that group is due to no or smaller estimated effect and not an artifact of smaller sample size. In addition we conducted a Z-test as proposed by Cohen (1959) substantiating the difference between effect sizes for the resource scarce and resource munificent groups. In all six cases there are strongly significant differences ( $p < .001$ ). These results consistently show that



young and small firms tend to choose solutions consistent with TCE prescriptions, but are less likely to do so when financial resources are abundant.

## **DISCUSSION**

This is the first study that measures asset specificity and behavioral uncertainty constructs and applies them to the relationship between sales growth and employment growth in emerging businesses. Our results suggest that transaction cost based explanatory variables have a significant influence on employment growth.

Our results provide answers to our initial research question. When is it reasonable to assume that employment growth accompany sales growth? According to our results and the logic of transaction cost economics (Williamson, 1996), employment growth should accompany sales growth in emerging companies when human asset specificity is relatively high and the costs associated with screening for potential employees and monitoring performance are lower than the cost of external contracting. The results of this study provide support for the hypotheses we derived from the predictions of transaction costs economics as framed by Williamson (1985, 1996). Our four measures of human asset specificity; (1) product specific knowledge, (2) firm specific knowledge, (3) the importance of protecting trade secrets, and (4) the importance of maintaining personalized customer relationships, are positive moderators of the relationship between sales growth and employment change in the full sample and when financial resources are relatively scarce. Although not hypothesized, product specific knowledge, firm specific knowledge, and the importance of customer relationships have a positive direct effect on employment growth. On this basis it may be speculated that firms requiring specialized company and product related skills appear to find it preferable to hire and train new employees to guarantee a certain service level, as opposed to sub-contracting this work to external parties.

These results are consistent with the findings of Anderson (1985) when she examined the propensity to employ or contract salespeople.

In contrast, the cost of screening for potential employees is a negative moderator of the sales growth/employment relationship, suggesting that under resource constrained conditions firms are more likely to seek ways, other than adding employees, to provide their product or service when behavioral uncertainty costs are high. This hypothesis is in a reverse direction from the others. The costs and hassles of screening permanent employees are not the same with temporary employees or with outsourced agreements. For example, when temporary employees are contracted, the temp agency assumes the role of screening employees. Likewise, if an emerging firm contracts with an external company to manufacture its product, it is only required to screen the manufacturer once, in contrast to the screening required for each permanent employee. Thus, the results of this hypothesis are consistent with practice.

Finally, when it is difficult to measure performance, firms are more likely to hire employees than to engage in external contracting. When outcomes are hard to measure, clan based controls (Mintzberg, 1978) are likely to take their place. Permanent employees will respond to controls based on culture more readily than temporary or subcontracted workers.

Also consistent with our hypothesis, TCE does not appear to be a resource neutral theory. Our findings suggest that managers of emerging firms often make choices inconsistent with the prescriptions of TCE with respect to employment. If they have sufficient financial resources they tend to avoid the sometimes undesirable expected consequences of hiring and managing employees (Wiklund et al., 2003). These results are consistent with those reported by Coles and Hesterly (1998). This has implications for the theory's applicability in the studied context, but in conjunction with findings from Coles and Hesterly (1998) who found support for

transaction cost predictions in for-profit hospitals, but not in not-for-profit hospitals, it seems reasonable to assume that the applicability of transaction cost economics is also more generally contingent on scarcity or abundance of resources. In the subgroup of firms with less than median financial munificence—those claiming financial resources were scarce—the relationships are strongly and consistently in harmony with the predictions of transaction cost economics. In contrast, transaction cost predictions become significantly weaker when resources are abundant.

One might well ask, if firms are not making profit maximizing choices, how do they have munificent resources? In our case these are young and small firms and resource availability may be a function of things other than the efficient operation of the business. For example, if a founder has another source of income such as significant savings, a pension, a working spouse, an inheritance, or proceeds from the sale of a property or a previous business, the psychic costs associated with increasing employment may be deemed not worthwhile even if it would make sense from a business perspective. Only when resources are scarce do individuals make resource efficient choices.

**Significance and Effect Size.** In the full sample and the resource scarce sub-sample our results are all statistically significant. However, based on Cohen's (1988) guidelines, the effect sizes (ranging from .015 to .066) are all considered small. The effect sizes, however, must be viewed in light of the theory. TCE is not intended to explain *why* firms grow. In fact, it only states that firms will tend to choose whether to hire permanent employees or to outsource or seek other options based on the relative costs of the transaction. Given this restricted scope of the theory our results are quite strong. In fact, the degree of support for hypotheses in this study is substantially greater than much of the transaction cost research that has been carried out previously (David & Han, 2004). A reason for this may be that our methodology meets some of

the challenges of developing measures that are grounded in transaction cost economics theory with multiple items for construct validity (David & Han, 2004; Rindfleisch & Heide, 1997).

### **Limitations**

From the initiation of this data set in 1994, approximately 75% of all the firms were confirmed to have gone out of business. An additional 5% are suspected to have gone out of business for one reason or another. As discussed in the introduction, because we are interested in addressing *how* emerging firms grow, we do not believe survivor bias to be a damaging limitation. We did not attempt to predict *why* firms grow.

Another limitation is that the sample is limited to Sweden. As noted in the Method section the particularities of Swedish employment security and wage setting institutions may lead to amplified TCE effects on reluctance to let employment growth follow sales development. Our results concerning munificence show that the TCE effects do not come through significantly in all contexts. Hence, to improve the generalizability of our results the study should be replicated in other settings.

While the sample covers the full spectrum of new firms started in 1994 in Sweden, the average size of the firms involved are quite small. Indeed the average size of the firms involved in the study in 2003 was slightly over 5 FTE (with standard deviation 55.9). The median sales in 1999 were approximately 510,000 SEK (during the time period of the study the exchange rate ranged between 6.6-10.6 SEK per 1 \$US). When data were collected in 2000, average size of the firms was 1.8 FTE (standard deviation 2.79) and 866,000 SEK in mean sales. Thus, there may be growth bias. Even though growth bias may exist, there is a strong argument for focusing on growing firms in entrepreneurship research, not only based on the economic value created by employing more people, but also that growing firms survive over longer periods of time (Phillips

& Kirchhoff, 1989). Further, as we emphasized in the Introduction with reference to Penrose (1959): in order to study *how* firms expand, growing (rather than dissolved) firms need to be studied.

In addition, all of our measures except sales come from a single source. CEO's were asked to report sales growth, employment growth, and perceived asset specificity and behavioral uncertainty variables. The threat of same source variance is mitigated somewhat because our measures refer to verifiable firm level characteristics rather than unobservable individual feelings (Podsakoff, MacKenzie, Lee & Podsakoff, 2003). For example, sales growth and employment growth are factual and verifiable measures. However, our asset specificity and behavioral uncertainty variables are perceptions of the situation rather than hard measures. Note, however, that tests of our hypotheses do not rely on correlations among perceptual variables. Moreover, common method bias would not explain the interactive relationships between predictor and outcome variables. To further help mitigate the threat of same-source bias, we used Harman's One-Factor Test as described by Podsakoff et al. (2003). We entered the 21 items measuring sales growth, employment growth, and TCE factors into an exploratory factor analysis. The first factor accounted for only 13.5 percent the total 65.1% variance and no single factor accounted for the majority of the covariance, suggesting that common method variance is not solely responsible for our findings.

Another measurement-related limitation of our study is that the TCE constructs were assessed. Such "prediction of the past" designs have been rather common in research on firm growth (Davidsson & Wiklund, 2000). It can also be argued that a fair amount of temporal stability appears a reasonable assumption for these variables. Nonetheless, a true longitudinal

assessment of these variables as possibly time-varying constructs to be re-assessed repeatedly during the studied period is a more recommendable approach for future studies.

Finally, our theoretical model specifies a direction of causality – employees are added to support sales growth. The direction of causality could be reversed and the addition of employees would then drive sales growth. However, in that scenario TCE factors would have a direct, but not a moderating role on employment growth. As can be seen in Table 3, direct effects are significant with product specific knowledge and firm specific knowledge in the full sample and in the resource constrained sub-sample. However, results are not significant with respect to any of the other variables. Although we acknowledge that causality could be reversed, the conception of our model is consistent with the rationale inherent in transaction cost economics, and the result are consistent with the direction of causality we have theorized.

### **Implications for Future Research**

The limitations associated with this study also provide opportunities for future research. It is possible to speculate that in some cases, the levels of high asset specificity in the firm worked as a source of competitive advantage for the firm (Barney, 2001) and therefore provided the basis for survival. At the same time, misuse, opportunism, overtraining or other problems with employing new individuals could be the reason for the firm to go out of business. It would therefore be valuable for future studies measuring growth and industry characteristics to address whether the same asset specificity measures associated with a positive relationship between sales growth and employment growth are also associated with survival in some way.

Also raised is an intriguing question of direction of causality. Our research is consistent with the literature (e.g. Delmar, 1997; Davidsson and Wiklund, 2000) in providing evidence that the relationship between sales growth and employment growth in emerging firms is smaller than

might be anticipated. However, it will require more fine-grained longitudinal research to determine for the part of the population where these two measures move together the whether employment growth occurs to meet the demands of sales growth, or alternatively whether employment growth provides opportunities for future sales growth.

Finally, the interaction between sales growth and transaction cost variables, explains a relatively small proportion of the variance in employment growth. Additional research will be required to identify other variables that influence that relationship.

## **Conclusions**

This is the first paper to apply transaction cost economics to explain the relationship between sales growth and employment growth in emerging ventures. It provides evidence that the predictions of transaction cost economics are consistently significant with this sample of emerging firms. In addition, it sheds further light on the influence of resource scarcity and the application of transaction cost economics.

The paper makes a significant contribution by adapting measures of asset specificity and behavioral uncertainty for application in emerging firms. It provides substantial evidence supporting the reliability and validity of the measures.

For policy-makers our results give input to a refined understanding of why the firm level pursuit of growth as measured by sales does not always translate into increased employment. The psychic and monetary costs of adding employees may deter many start-up businesses from adding employees. Thus, if employment growth is a desired societal outcome, policy makers may focus on reducing the political and administrative obligations associated with creating and expanding employment.

These primary conclusions are useful for understanding how transaction cost economics predictions apply to sales growth and employment in emerging firms. We note that the total amount of variance accounted for is small; however, it must be understood that the transaction costs model does not purport to be the major theoretical explanation of *why* firms add employees, but rather explains a portion of *how* sales growth and employment growth are associated. The implication of transaction cost theory for emerging firms is that as market opportunities arise, they will be either more or less likely to support that growth by adding permanent employees depending on the transaction costs inherent in the employer/employee relationship vs. those associated with external contracting for goods and/or services (Williamson, 1985, 1996).



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TABLE 1  
Confirmatory Factor Analysis Results\*

Items	Null Single Factor Model	6 Factor Model
<b>1. Product Specific Knowledge:</b> Coefficient alpha=.85	X	1
How much time, training and energy would it take for new employees to gain basic knowledge about the firm’s products or services?	X	1
How much time, training and energy would it take for new employees to become proficient in using/selling your products and/or services?	X	1
How much time, training and energy would it take for new employees to become expert with regards to your products and/or services?	X	1
How much time, training, and energy would it take for a new employee to become fully qualified to deal personally with your customers on product/service issues?	X	1
<b>2. Firm Specific Knowledge:</b> Coefficient alpha=.80		
How much time, training and energy would it take for new employees to become proficient in your company’s specific way of doing things?	X	2
How much time, training and energy would it take for new employees to learn how the firm works at a basic level?	X	2
How much time, training and energy would it take for new employees to learn specific company policies and procedures?	X	2
<b>3. Importance of Customer Relationships:</b> Coefficient alpha=.82		
How important would it be for your employees to be fully aware of the specific needs of very atypical customers?	X	3
How important would it be for customers to develop loyalty to a specific employee?	X	3
How important would it be for your employees to develop close working relationships with your customers?	X	3
How important would it be for your employees to have an in-depth understanding of what your customers need?	X	3
<b>4. Importance of Trade Secrets:</b> Coefficient alpha=.90		
How necessary would it be for you to share trade secrets with new employees about the processes and technology that the firm uses?	X	4
How necessary would it be for you to share closely held information with new employees about business opportunities, knowledge of suppliers etc., that could impact your ability to compete?	X	4
How necessary would it be for you to trust new employees with confidential information about customers?	X	4
<b>5. Difficulty in Screening and Supervising:</b> Coefficient alpha=.69		
It is very difficult to find employees with the appropriate skills.	X	5
There is no way to know if a potential employee is good or bad until you have hired the person in question.	X	5
There is a lot of risk associated with hiring new employees.	X	5
If we hire someone, there is a strong likelihood they will not have appropriate knowledge.	X	5
It is costly and time consuming to make sure employees continue to work hard.	X	5
<b>6. Difficulty Measuring Performance:</b> Coefficient alpha=.71		
In our company, it is not easy to monitor whether or not an employee is doing a good job.	X	6
In our company it is easy to see individual employee performance results (RS)	X	6
AGFI	.58	.95
CFI	.47	.96
IFI	.48	.96
RMSEA	.15	.04

**Table 2**  
**Descriptive Statistics and Correlations for Key Variables**

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Ln Employees 1994	-0.06	.86														
2. Product Specific Knowledge	3.91	.79	.11													
3. Firm Specific Knowledge	3.34	.83	.12	.58												
4. Customer relationships	3.90	.81	.00	.31	.25											
5. Proprietary information	2.68	1.12	.01	.31	.31	.31										
6. Supervision Required	3.47	.72	.10	.25	.32	.16	.18									
7. Difficulty measuring performance	1.74	.78	-.04	-.11	-.10	-.19	-.06	-.21								
8. Prod specific know*ln sales growth	33.1(0)	6.80	.12(.11)	.99(-.06)	.58(-.06)	.30(-.02)	.31(-.04)	.24(-.01)	-.10(.03)							
9. Firm specific know*ln sales growth	28.33(0)	7.08	.13(.14)	.58(-.04)	.99(-.06)	.25(-.02)	.31(-.04)	.30(.01)	-.09(.02)	.60(.92)						
10. Customer relations*ln sales growth	33.05(0)	6.93	.01(.11)	.31(-.04)	.25(-.04)	.99(-.07)	.32(-.05)	.15(-.02)	-.18(.00)	.33(.77)	.27(.76)					
11. Proprietary Info*ln sales growth	22.72(0)	9.55	.02(.10)	.31(-.03)	.32(-.04)	.31(-.02)	.98(-.05)	.18(.02)	-.06(.02)	.32(-.91)	.32(.91)	.32(.77)				
12. Screening *ln sales growth	29.44(0)	6.17	.10(-.17)	.26(-.01)	.33(.02)	.16(-.01)	.19(.03)	.98(-.04)	-.20(.03)	.27(-.61)	.34(-.67)	.18(-.54)	.19(-.69)			
13. Measuring perf*ln sales growth	14.76(0)	5.78	-.03(.15)	-.09(-.03)	-.09(-.04)	-.19(-.01)	-.06(-.04)	-.21(.02)	.99(.02)	-.08(.87)	-.08(.95)	-.17(.73)	-.05(.92)	-.19(-.79)		
14. Ln sales growth	8.46	.26	.06	.06	.07	.02	.05	-.02	.04(.03)	.12(-.64)	.17(-.65)	.17(-.54)	.10(-.72)	.15(.54)	.12(-.72)	
15. Ln employees added	.92	.54	.00	.09	.13	.02	.00	.01	.07	.13(-.01)	.16(-.03)	.06(-.01)	.02(-.03)	.05(.01)	.09(-.02)	.22

( ) centered interaction terms  
 Correlations > .05 significant p < .05  
 Correlations > .07 significant p < .01  
 Correlations > .09 significant p < .001

**Table 3**  
**Moderated Hierarchical Regression Analysis**

Variables	Product Specific Knowledge			Firm Specific Knowledge			Importance of Customer Relationships		
	Full Sample	Scarce	Abundant	Full Sample	Scarce	Abundant	Full Sample	Scarce	Abundant
<b>Block 1</b>									
Manufacture food products 15xxx	-.01	-.04***	.02	-.01	-.04	.02	-.00	-.05	.02
Publishing and printing 22xxx	-.02	-.05	.00	-.01	-.05	.03	-.01	-.05	.03
General mechanical engineering 28520	-.01	-.03	-.00	-.01	-.03	.00	-.01	-.03	.00
Demolition and earth moving 45110	-.00	.06	-.04	-.00	.06	-.04	-.00	.08	-.05
General construction of buildings 45211	.08*	.17***	.02	.08*	.17***	.02	.08*	.17	.02
Installation of electrical wiring 45310	.04	.04	.04	.04	.04	.04	.05	.05	.04
Painting 45441	-.00	-.03	.01	-.00	-.03	.01	-.00	-.03	.01
Sales/maintenance of motor vehicles 50000	-.05	-.06	-.04	-.05	-.06	-.04	-.05	-.06	-.04
Wholesale trade 51000	.06	.01	.08*	.06*	.01	.08*	.07*	.01	.10**
Retail trade 52000	-.02	.03	-.05	-.02	.03	-.05	-.03	.03	-.06
Restaurants 55300	.02	-.02	.04	.02	-.02	-.04	.01	-.02	.04
Taxi operation 60220	.02	.00	.05	.03	.00	.05	.03	.00	.06
Freight transport by road 60240	.01	.15***	-.06	.01	.16**	-.06	.01	.02	-.07
Financial intermediation 65000	-.06*	-.04	-.07	-.06*	-.05	-.07*	-.06*	-.04	-.06
Software consultancy and supply 72201	-.07*	-.07	-.07*	-.07*	-.07	-.07*	-.07*	-.05	-.07*
Other business activities 74000	.01	.05	-.01	.01	.05	-.01	.01	.06	-.01
Accounting, bookkeeping, auditing 74120	-.06*	-.01	-.09*	-.06*	-.01	-.08*	-.06*	.01	-.09
Business consulting 74140	-.07*	-.08	-.07	-.07*	-.08	-.07	-.07*	-.07	-.07
Construction engineering 74202	-.06*	-.08	-.05	-.06*	-.07	-.05	-.06*	-.06	-.06
Advertising agencies 74401	-.03	-.04	-.02	-.03	-.04	-.02	-.03	-.04	-.02
Education 80000	-.04	-.04	-.05	-.04	-.04	-.04	-.04	-.03	-.05
Medical practice activities 85120	.01	.05	-.00	.01	.06	-.00	.01	.06	-.00
Other human health activities 85140	-.06*	-.04	-.08*	-.06*	-.04	-.08*	-.06*	-.03	-.08*
Artistic and literary creation 92310	-.06*	-.08	-.04	-.06*	-.09	-.03	-.05	-.06	-.04
Hairdressing 93021	-.08*	-.06	-.09*	-.07**	-.06	-.08*	-.08*	-.06	-.09*
Physical well-being activities 93040	-.07*	-.11*	-.04	-.07*	.10*	-.04	-.06*	-.011	-.03
Block 1 change R-square	.05***	.12***	.06**	.05***	.12***	.06**	.05***	.12***	.07***
<b>Block 2</b>									
#Employees in 1995	-.07**	-.07*	-.13***	-.07*	-.07	-.13***	-.06*	-.07*	-.11*
Natural log of the slope of the sales line	.20***	.16***	.30***	.20***	.16***	.30***	.20***	.16***	.30***
Product Specific Knowledge	.09***	.01	.12***						
Firm Specific Knowledge				.12***	.04	.15***			
Importance of customer relations							.04	.02	.04
Importance of trade secrets									
Level of Supervision Required									
Difficulty Measuring Performance									
Block 2 change R-square	.05***	.03***	.10***	.06***	.03***	.11***	.05***	.03***	.08***
<b>Block 3</b>									
Ln sales*product specific knowledge	.24***	.57***	.007						
Ln sales*firm specific knowledge				.23***	.47***	-.07			
Ln sales*customer relations							.15***	1.28***	-.04
Ln sales*importance of trade secrets									
Ln sales*level of supervision									
Ln sales*difficult measuring perf.									
Block 3 change R-square	.03***	.04***	.00	.03***	.03***	.00	.02***	.04***	.00
Adjusted R-Square for Total Model	.16***	.14***	.13***	.12***	.13***	.14***	.09***	.13***	.12***
f <sup>2</sup> Effect Size	.032	.043		.028	.034		.015	.036	
Total Model F	6.85***	3.56***	5.16***	6.95***	3.44***	5.58***	5.23***	3.21***	4.67***
Z-Test for Scarce vs. Abundant			3.26***			4.02***			4.09***
N	1346	477	868	1358	481	876	1284	449	834

\*p<.05; \*\*p<.01; \*\*\*p<.001

**Table 3 Continued**  
**Moderated Hierarchical Regression Analysis**

Variables	Importance of Proprietary Information			Level of Supervision Required			Difficulty Measuring Performance		
	Full Sample	Scarce	Abundant	Full Sample	Scarce	Abundant	Full Sample	Scarce	Abundant
<b>Block 1</b>									
Manufacture food products 15xxx	-.00	-.04	.02	-.00	-.05	.02	-.01	-.05	.01
Publishing and printing 22xxx	-.01	-.05	.03	-.01	-.05	.03	-.01	-.05	.03
General mechanical engineering 28520	-.01	-.03	.00	-.02	-.03	-.00	-.01	-.03	-.00
Demolition and earth moving 45110	-.01	.06	-.05	-.00	.08	-.05	.01	.06	-.05
General construction of buildings 45211	.08*	.17***	.02	.08*	.17***	.02	.08	.17***	.02
Installation of electrical wiring 45310	.04	.04	.05	.04	.04	.04	.04	.04	.04
Painting 45441	-.00	-.03	.01	-.01	-.03	.01	-.00	-.03	.01
Sales/maintenance of motor vehicles 50000	-.04	-.07	-.02	-.05	-.06	-.04	-.05	-.06	-.04
Wholesale trade 51000	.06	.00	.09**	.07*	.01	.10**	.07*	.01	.10**
Retail trade 52000	-.02	.03	-.05	-.03	.02	-.05	-.02	.03	-.05
Restaurants 55300	.02	-.02	.04	.01	-.02	.04	.02	-.02	.05
Taxi operation 60220	.03	.00	.06	.02	-.00	.05	.02	.00	.05
Freight transport by road 60240	.01	.16***	-.06	.01	.16***	-.07	.01	.16***	-.06
Financial intermediation 65000	-.06	-.05	-.06	-.06	-.05	-.06	-.06*	-.04	-.07
Software consultancy and supply 72201	-.07	-.06	-.07	-.06*	-.06	-.07	-.07	-.06	-.07*
Other business activities 74000	.02	.05	-.01	.01	.06	-.02	.01	.06	-.02
Accounting, bookkeeping, auditing 74120	-.07	-.03	-.08*	-.07*	-.02	-.09**	-.07*	-.02	-.09*
Business consulting 74140	-.07	-.08	-.07	-.07*	-.08	-.07	-.07*	-.07	-.07
Construction engineering 74202	-.07	-.08	-.06	-.07*	-.08	-.06	-.06*	-.08	-.06
Advertising agencies 74401	-.03	-.04	-.02	-.03	-.04	-.02	-.03	-.04	-.02
Education 80000	-.04	-.05	-.04	-.04	-.05	-.04	-.04	-.03	-.04
Medical practice activities 85120	.01	.06	-.00	.01	.06	-.00	.01	.06	-.00
Other human health activities 85140	-.06	-.03	-.08*	-.06*	-.02	-.08*	-.06*	-.04	-.08*
Artistic and literary creation 92310	-.05	-.09	-.03	-.05	-.06	-.04	-.06*	-.09	-.04
Hairdressing 93021	-.08	-.06	-.09*	-.08*	-.06	-.08*	-.07*	-.05	-.09*
Physical well-being activities 93040	-.06	-.11*	-.03	-.06*	-.11*	-.03	-.06*	-.11*	-.03
Block 1 change R-square	.05***	.12***	.06***	.05***	.12***	.06**	.05***	.12***	.07***
<b>Block 2</b>									
#Employees in 1995	-.06	-.07	-.10**	-.06*	-.07	-.107**	-.06*	-.06	-.11**
natural log of the slope of the sales line	.21	.16***	.30***	.21***	.16***	.30***	.20***	.17***	.29***
Product Specific Knowledge									
Firm Specific Knowledge									
Importance of customer relations	.02	-.03	.03		-.01	-.01			
Level of Supervision Required				.00	-.01	-.01			
Difficulty Measuring Performance							.06	.04	.07*
Block 2 change R-square	.04***	.03***	.08***	.04***	.03***	.08***	.05***	.03***	.08***
<b>Block 3</b>									
Ln sales*product specific knowledge									
Ln sales*firm specific knowledge									
Ln sales*customer relations									
Ln sales*importance of trade secrets	.26***	.75***	-.06						
Ln sales*level of supervision				.16***	-.34***	.03			
Ln sales*difficult measuring perf.							.30***	.56***	-.32***
Block 3 change R-square	.03***	.06***	.00	.02***	.04***	.00	.038***	.05***	.03***
f <sup>2</sup> Effect Size	.032	.066		.017	.039		.040	.056	.027
Adjusted R-Square for Total Model	.11	.16	.12	.09	.14	.11	.12	.15	.15
Total Model F	6.11***	3.93***	4.65***	5.29***	3.34***	4.46***	6.92***	3.71***	5.86***
Z-Test for Scarce vs. Abundant			5.18***			3.88***			5.89***
N	1293	452	840	1283	450	832	1319	462	856

\*p<.05; \*\*p<.01; \*\*\*p<.001

**Table 4**  
Summary of Results

<b>Hypothesis</b>	<b>Results</b>		
	<b>Full Sample</b>	<b>Resource Scarce</b>	<b>Resource Abundant</b>
1. The degree of product specific knowledge required for new employees will be a positive moderator of the relationship between sales growth and employment growth.	Supported	Supported	Supported
2. The degree of firm specific knowledge required for new employees will be a positive moderator of the relationship between sales growth and employment growth.	Supported	Supported	Supported
3. The degree to which personalized customer service matters will be a positive moderator of the relationship between sales growth and employment growth.	Supported	Supported	Not Supported
4. The degree to which proprietary information needs to be shared with employees is a positive moderator of the relationship between sales growth and employment growth.	Supported	Supported	Not Supported
5. The degree to which supervisory oversight is required is a negative moderator of the relationship between sales growth and employment growth.	Supported	Supported	Not Supported
6. The degree to which it is difficult to monitor employee performance is a positive moderator of the relationship between sales growth and employment growth.	Supported	Supported	Not Supported
7. In resource munificent environments the relationship between the transaction costs variables and employment is significantly weaker than in resource scarce environments.	Supported		