

**The Determinants of Firm Growth in Small and Micro Firms –  
Evidence on relationship lending effects**

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**Abstract.** This paper examines the impact of firm level variables on the growth of small and micro firms operating in Finland. This study is the first one to investigate the impact that lending relationships have on growth. The results of our primary regressions show that close lending relationships enhance growth for all firms, but that only the larger firms in our sample benefit from more competitive banking markets. When we split the data into manufacturing and non-manufacturing firms, we find that only non-manufacturing firms benefit from close bank-borrower relationships. We additionally find that younger firms exhibit higher growth rates than older firms. Firm size seems to have a more complicated relationship with growth. Our results suggest that in the case of smaller firms an increase in size initially increases growth, but the effect is reversed after a certain level. For the larger firms with more than ten employees, we cannot reject Gibrat's law. Contrary to previous studies, we find that legal form is a significant determinant of firm growth only in the absence of more detailed ownership variables.

Key words: Growth, small firm, relationship lending

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## **The Determinants of Firm Growth in Small and Micro Firms – Evidence on relationship lending effects**

### **1. Introduction**

While some surveys show that growth is not an objective for all small and medium sized firms, the ability of firms to grow is important, because it has been suggested that firms with low or negative growth rates are more likely to fail (Phillips and Kirchhoff, 1989). Storey (1994) suggests that there are three categories of factors that influence the growth of small firms. The first group of factors is that of the entrepreneurs' individual resources. These are factors that can be identified prior to the establishment of the business. The second group of factors is firm specific characteristics such as the firm's size, age and legal form and the third group is formed by the strategic choices made by the entrepreneur or the owners of the firm.

Gibrat's law has been a much revisited benchmark for research on the determinants of firm growth since its formulation in 1931 (Sutton, 1997). This law essentially states that firm growth is independent of firm size. Empirical literature on the relationship between firm size and growth has for the most part rejected the model, while some have not been able to reject it for larger firms. Most empirical studies on the determinants of firm growth find that there is an inverse relationship between firm age and growth. These findings are in line with Jovanovic (1982), whose theory of firm growth states that firms uncover their true efficiencies over time. Previous empirical literature suggests that other firm characteristics in addition to size and age may also affect firm growth. These characteristics include the firms' legal form, ownership structure and location among others.

The above mentioned characteristics are only one size of the growth puzzle. It is possible that firm growth is also affected by different types of barriers. These barriers can be divided into internal barriers, such as the motivation to grow, and external barriers. According to Storey (1994), the most important external barriers for UK firms are the availability and cost of

funding. Small firms face specific constraints in raising external finance (Berger and Udell, 1998). They find it difficult to obtain outside capital in small amounts (this is often referred to as the Macmillan gap) and when they are able to obtain debt capital, it is at high interest rates (Storey, 1994). The inability of small firms to raise outside capital often results in a situation where these firms have to finance growth internally. Carpenter and Petersen (2002) investigate the relationship between internal finance and growth in a sample of small manufacturing firms. They find that the growth of most small firms in their sample is constrained by internal finance. The approach in our study is more in line with Becchetti and Trovato (2002), who find that the availability of external finance is an important determinant of firm growth in their sample of Italian small and medium sized firms. They also suggest that the underlying reason behind this finding might be the bank centered nature of the Italian financial markets. We are able to test their predictions in another bank centered financial market, namely Finland.

It has been suggested that difficulties in obtaining outside capital may be alleviated by the nature of the bank-borrower relationship. Previous studies on relationship lending suggest that close bank-borrower relationships enhance credit availability, especially for small firms. Among others, Binks and Ennew, 1997, investigate different attributes of bank-firm relationships and suggest that small businesses could benefit from a closer and more informed relationship with their banks. Other studies show that the duration of the relationship decreases interest rates and collateral requirements (e.g., Berger and Udell, 1995). Contrary to most other studies, Degryse and Van Cayseele (2000) find that in Europe contract terms seem to deteriorate with the length of the bank-borrower relationship. Boot (2000) suggests that this may be caused by the fairly consolidated nature of the banking sector in Europe with fewer credit alternatives for borrowers. Previous studies on Finnish data (e.g., Niskanen and Niskanen, 2000) additionally find that while contract terms deteriorate with relationship length for larger firm, they improve with relationship length for smaller firms. More recently, Niskanen and Niskanen (2004) find that firms with long-term relationships and firms that have recently switched their main bank are more likely to have restrictive covenants in their loan contracts. Elston (2004) and Agarwal and Elston (2001) use data on large listed German firms and adopt a slightly different approach on bank-borrower relationships. Their measure of bank-borrower relationships, or bank influence, is based on the banks ownership stake in the firm or the bank having a chair of the firm's supervisory board. Agarwal and Elston (2001) suggest that bank monitoring does not result in stronger growth.

Elston (2004) finds that bank monitoring results in lower growth rates, but only in the absence of more detailed control variables. Based on previous evidence it could be expected that tight lending relationships enhance growth in a sample of small and micro firm data.

This study uses firm level data on small and micro sized firms. This setting provides an excellent opportunity for investigating the impact that a number of firm specific factors have on firm growth. Finland was exceptionally severely hit by the economic depression of the early 90's. Our sample provides a good forum to investigate the attributes of firms that were able to grow in the years following the depression. To our knowledge, this paper is the first one to investigate the relationship between firm growth and relationship lending variables on small firm data. This paper differs from previous literature also because of the variety of industries represented in the database. The growth rate that we use is defined as the average annual growth in sales during a four year period between 1994 and 1997. A similar approach has previously been adopted by, e.g., Roper (1999), while most studies in the field investigate growth in employment. We choose our measure, because firms rarely select employment growth as their goal per se. It could also be argued that our sample of Finnish firms justifies this choice even more due to the excessively high labor cost imposed on local employers<sup>1</sup>. These costs are often stated to be a major barrier for small firms to increase the number of their employees.

The rest of the paper is divided into 5 sections. Chapter two presents the data and the variables. In chapter three we present results from regressing the growth rate on a number of firm specific and relationship variables. The results are presented separately for the i) total sample, ii) for firms with less than ten employees and iii) for firms with more than ten employees. Chapter four presents additional tests where the sample has been divided into firms operating under a limited liability legal form and into firms under unlimited liability. Chapter five presents the results for manufacturing and non-manufacturing firms separately. Chapter six concludes the paper.

## **2. Data and dependent variables**

The data for the study were collected through a private survey which targeted all except small service industry firms (net sales below 1 million FIM, 1 euro ~ 6 FIM) operating in the Häme region in mid-western Finland. The data consist of small and medium sized companies the total

number of observations being 2672. The number of observations used in the regression tests in tables 3 and 4 is smaller due to missing observations in some variables.

(TABLE 1)

Table 1 presents the average growth rates by industry, size and legal form. Our dependent variable is defined as the average annual growth rate in sales during the four year study period of 1994-1997. While the average growth rate in the total sample was 7.6 %, there is substantial variation across industries. The highest growth rates were observed in transportation (10.8 %) and real estate services (9.7 %). The smallest growth rates are observed in the group of other industries (mainly agricultural), where the growth rate was 0.3 % and in hotels and restaurants with a growth rate of 3 %. Panel II of table 1 differentiates between firms with less than 10 employees and those with more than 10 employees. This classification into small and micro firms is based on the definition applied by the European Community. Overall, the growth rate seems to increase with firm size. This also holds in most industries, with the exception of manufacturing firms and utilities. Panel III further divides the data into firms with a limited liability legal form and firms under unlimited liability. In this case firms under limited liability have a higher growth rate on average. Again, this also holds for most industries, this time with the exception of utilities.

(TABLE 2)

Table 2 shows descriptive statistics on key variables. Again, column I presents results for all observations, column II splits the data in to small and medium sized firms based on the number of employees and column III presents results for firms under limited liability and unlimited liability. Finally, column IV splits the data into manufacturing and non-manufacturing firms. We also present tests of statistical differences of the means between the groups in column II, III and those in column IV. The results in column I show that the average firm has 32 employees and that it was established 18 years ago. The average firm borrows from 0.89 banks and the relationship with its main bank has lasted for 7.5 years. The controlling family holds 54 percent of the average firms shares, while management holds 61 percent. Only 6 percent of the

sample firms are parent companies and 11 percent are subsidiaries. Finally, 69 percent of the firms operate under limited liability.

The results in column II suggest that larger firms grow faster, are older, more levered less profitable and are more likely to be located in an urban area. Larger firms also seem to have more banking relationships and are more likely to have changed their main bank. As far as ownership is concerned, the share of family or management ownership is smaller in larger firms. Larger firms are also more likely to be part of a larger entity. The results in column III show that firms under limited liability grow faster, are less profitable, and are more likely to be located in an urban area. They also borrow from more banks, have shorter banking relationships and are more likely to have switched their banks recently. The ownership structure of limited liability firms seems to be less concentrated at least in terms of management or family ownership. Limited liability firms are also more often part of a large corporation and have received more government subsidies in the recent past.

The results for the manufacturing and non-manufacturing firms in column III suggest that the manufacturing firms have more employees and that they are older and more profitable than the non-manufacturing firms. The manufacturing firms are more financially constrained, when this is measured by the likelihood that their loan has been rejected, and they are more likely to have changed their main bank in the recent past. Manufacturing firms are also more likely to operate under limited liability, and more likely to be either parent companies or subsidiaries. Finally, the manufacturing firms in our sample receive more subsidies than the non-manufacturing firms do.

### **3. Determinants of growth in small and micro firms**

Table 3 presents results from regressing the average annual growth rate on different variables characterizing the firm and its environment. The equation in column I of table 3 represents the total sample. In columns II and III we divide the sample into small firms and micro firms. Column II includes observations from small firms with more than 10 employees and column III observations from micro firms with less than 10 employees.

*Firm age.* Firm age and size are the two most commonly investigated independent variables suggested to affect firm growth. The impact of both variables has been verified in the empirical literature. The general pattern between firm age and growth seems to be that young firms are more likely to grow faster. Almus and Nerlinger (1999), Davidsson et al. (2002), Glancey (1998), Wagner (1995), and Wijewardena and Tibbits (1999) all find an inverse relationship between firm age and growth suggesting that older firms grow less rapidly than younger firms. Our measure of firm age is the natural log of (1+age), because it can be argued that the impact of one extra year diminishes as the firm gets older. The results in table 3 confirm previous findings on the relationship between firm age and growth. The variable takes a negative and statistically significant coefficient in all three columns of table 3 suggesting that younger firms grow faster than older firms.

(TABLE 3)

*Firm size.* The results of empirical studies on the relationship between firm growth and firm size are not equally unanimous. In most studies on small firms, e.g., Caves (1998), Harhoff et al. (1998), and Almus and Nerlinger (2000), Gibrat's law is rejected. Other studies, e.g., Evans (1987) and Hall (1987) suggest that deviations from the law become smaller when data on larger firms is used and finally Hall (1987) cannot reject the law for larger firms. Our measure of firm size is the natural log of the firms' total assets. While most studies assume a linear growth-size relationship, we also add the square of this variable to capture the possible non-linear shape of the firm growth-size relationship suggested in, e.g., Evans (1987). Our results in column I of table 3 show that the size variable takes a positive and highly significant sign, while the squared variable takes a negative and statistically significant coefficient. This suggests that the growth rate initially increases with firm size but then starts to decrease after a certain level. When we separate the sample into firms with more than ten employees and those with less than ten employees, we find that the results are significant only for the smaller firms. Therefore, we are not able to reject Gibrat's law for the firms with more than 10 employees.

*Profitability.* A number of surveys suggest that small firms in particular are willing to finance their growth internally. In fact, in a recent survey by the Finnish Bankers' Association, 75 percent of small firms and 70 percent of micro firms stated that they intended to finance future

investments internally. These findings are in line with Myers (1984), who claims that capital structure is driven by the firms' desire to finance new investments first internally, then with low risk debt, and finally with outside equity only as a last resort. Carpenter and Petersen (2002) investigate a sample of small firms and find that the growth of small firms is constrained by internal finance. Our proxy for the firms' internal funding resources is the operating profit margin. The results in column III indicate that an increase in profitability enhances growth in firms with less than 10 employees. The variable is not significant in the other two columns.

*Location.* Storey (1994) suggests that there are some locations in which firms are more likely to grow faster. According to the evidence presented, U.K. firms located in rural areas can be expected to grow faster than those in urban centers. Davidson et al. (2002) obtains somewhat similar results by using Swedish data. Their results suggest that firms located in a number of smaller communities grow slower than those located in the capital area. Almus and Nerlinger (1999) use regional population density as their location variable, and find weak evidence that location affects growth. Their findings show that firms located in densely populated areas exhibit higher growth rates. We add a dummy variable indicating whether the firm is located in an urban area or not to measure the location effect. The variable obtains the value of one if the firm is located in an urban center. Because of the conflicting evidence presented above, the expectations on variable are mixed. The results in table 3 indicate that location is not a significant factor in determining firm growth in our sample.

*Financial structure and status.* Financial constraints have been suggested to be one of the most important barriers to growth (Storey, 1994). It has also been suggested, that especially small firms face difficulties in obtaining outside funding. Becchetti and Trovato (2002) find that firms' which have been credit rationed by their financial institutions are likely to have slower growth rates. We use two different variables to measure the financial structure and status of the sample firms. Our first measure is a dummy indicating whether the firm has been rejected a loan recently. The results for this variable take a positive and statistically significant coefficient in the group of micro firms. This result is somewhat puzzling, but it could be interpreted to mean that the firms are financially constrained because of their high growth rates that have persisted even prior to the sample period, not vice versa. We also add the firms' debt-to-assets ratio to measure leverage and find that an increase in leverage inhibits growth when the total sample is investigated in column I. The results for the larger firms in column II suggest exact the opposite, even if the



result is somewhat weaker. One possible reason behind these results could be that the firms in our sample have on average quite high debt -to-assets ratios (78 percent). While the ratio for the larger firms is only marginally lower (74 percent), it could be argued that larger firms are better at managing their debt.

*Subsidized.* Government subsidies exist mainly to enhance firm performance, and previous studies by, e.g., Gale (1991) and Schwartz and Clements (1999) has shown their importance. Becchetti and Trovato (2002) investigate the impact that subsidies have on firm growth in a sample of Italian firms by using a dummy variable to indicate whether the firm has received subsidies and find that firms that have received subsidies exhibit higher growth rates. To measure this effect, we add a variable measuring the amount of government subsidies, either in terms of loans or grants, that the firm has received directly prior to the research period. The results on this variable are not significant in table 3, suggesting that subsidies have no impact on firm growth on average.

*Legal form.* Businesses can operate under several different legal forms, but the main differentiating factor, as far as growth is concerned, is whether the legal form offers the owners limited liability or not. Previous studies on German data (Harhoff et al., 1998; Almus and Nerlinger, 1999) and Swedish data (Davidsson et al., 2002), show that firms with limited liability grow faster than firms with unlimited liability. This is interpreted to imply that limited liability firms' owners are more willing to invest in risky ventures that may foster firm growth. Harhoff et al. (1998) also find that firms with a limited liability are more likely to become insolvent than comparable firms with full liability. We use a dummy variable to indicate whether the firm is operating under limited liability legal form or not. The results in table 3 suggest that legal form is not a significant factor of growth behavior in our sample. This result is somewhat surprising given the results of previous studies and our univariate findings in table 2. One possible explanation behind this result could be that the same effect is captured by our ownership variables. To investigate this possibility further, we run the model in column I without the ownership variables presented below and obtain a positive and statistically significant coefficient for the limited liability firm dummy variable. This result is equally significant in the sample of the smaller firms.<sup>2</sup>

*Ownership.* Previous literature suggests that business ownership, too, may have an impact on firm growth. Managerial ownership in particular has raised a lot of attention in the literature. Previous literature (e.g., Morck, Schleifer and Vishny (1988) and MocConnell and

Servaes (1990)) indicates that management ownership tends to affect shareholder wealth positively at low levels of ownership and negatively at high levels of ownership. This implies that management is willing to take risks and aim at high growth rates at low levels of ownership and change their attitude towards risk taking when ownership grows to levels where their wealth becomes undiversified. The same arguments can be extended to the family ownership in small firms. Becchetti and Trovato (2002) use the amount of ownership held by shareholders controlling the firm, and find no significant impact on firm growth. We include two ownership variables in our model. The first one measures the owner family's share of the company's ownership. The other one measures management ownership in the firm. The results in column I of table 3 suggest that an increase in family ownership has a negative impact on firm growth. The opposite holds for management ownership. It seems that an increase in management ownership has a positive impact on growth. When the sample is split into the subsamples in columns II and III, we can see that the results only hold for the firms with less than 10 employees. These results seem to imply that when the controlling family's share of the firm's ownership increases, so does their risk aversion. The unwillingness to take risks in turn results in lower growth rates for these firms. The opposite seems to hold for management ownership. The results suggest that when management's ownership in the firm increases, their willingness to venture risky investments that foster growth increases.

*Governance.* Business governance, too, has been suggested to affect firm growth. Davidsson et al. (2002) use dummy variables for parent companies, subsidiaries and independent firms. Their results indicate that independent firms grow faster than firms with parent-corporate relationships. We include two measures of business governance in the regression models. The first one is a dummy indicating that the firm is a parent company. The second one is a dummy indicating if the firm is a subsidiary of another company. The independently operating companies of our sample serve as the control group for these variables. The results for the total sample in column I of table 3 suggest that subsidiaries have smaller growth rates than independent firms. The results for micro firms in column III suggest that parent companies grow faster than independent firms.

*Bank-borrower relationships and interbank competition.* The impact of bank-borrower relationships has been investigated on a number of factors. The results are mixed. Most studies find that small firms benefit from close, long term lending relationship in terms of cheaper

credit and easier access to outside funding. Other studies contradict these results partly and find that once the relationship becomes too tight or lengthy, the situation is reversed. We include three different relationship lending variables in our models of corporate growth. The first one is the number of lending banks that the firm uses. The second one is a dummy variable indicating whether the firm has changed its main bank during the recent years and the third one is the number of banks operating in the county of firm location. The results for the whole sample in column I of table 3 and those for the larger firms in column II suggest that an increase in the number of banks that the firm uses to lend from decreases its growth rate. This result is well in line with the part of the relationship lending literature that suggests that firms with more lending relationships may be financially constrained by their banks, which in turn hinders growth. The results for bank change are not statistically significant. The results for the variable measuring the effect of interbank competition, on the other hand, seem to differ by firm size. The larger firms seem to benefit from interbank competition, while the smaller firms grow less rapidly in areas where a large number of banks operate. These findings are in line with the ideas that information asymmetries are more severe for smaller firms, who are not able to reap the benefits of increased competition between rivaling banks.

*Industry.* We add seven different industry dummies to our model to control for industry specific differences in growth rates. It is commonly accepted that firms in different industries exhibit different growth rates. These differences are also apparent in our descriptive findings in table 2. Almus and Nerlinger (1999) split their sample into firms that operate high-tech, medium-tech and low-tech industries. Dunne and Hughes (1994) include 19 industry dummies in their investigation and Harhoff et al. (1998) use a sample of firms in the manufacturing, construction, trade and service industries. These results suggest that most industry specific variation is already captured by the other variables included in the model. We investigate the possibility that the impact of the independent variables varies by industry further in section 5, where we run the model separately for manufacturing and non-manufacturing firms.

Overall, we can conclude that our model works best for the micro firms with less than 10 employees. The growth of the firms with more than 10 employees is only affected by firm age, leverage and relationship lending attributes and the competitiveness of the local banking community. The growth of the micro firms is also affected by firm size, profitability and ownership structure. We test for the equality of coefficients in the two sub samples.<sup>3</sup> The results

suggest that the observed differences on the coefficients for profitability, parent company, family ownership, managerial ownership and relationship lending are statistically significant.

#### **4. Determinants of growth investigated by legal form**

The results in the previous chapter showed that legal form does not have an effect on the growth rate of the firms in our sample firms on average. This does not necessarily mean that there are no differences in the growth patterns of firms operating under limited liability versus firms under unlimited liability. To take into account this possibility we run an additional model in table 4, where we split the data into two groups. Column I presents the results from running the model on limited liability firms and column II for unlimited liability firms.

(TABLE 4)

The results for the firms under limited liability in column I of table 4 indicate that we are not able to reject Gibrat's law for this subsample<sup>4</sup>. For unlimited liability firms in column II we find that, contrary to the expectations, there is a positive coefficient on firm size indicating that larger firms grow faster. Age is an important determinant of growth in both groups. Similar to previous studies, we find that older firms have slower growth rates in both subgroups. This result is well in line with the results in chapter three as well as our expectations. Firms under unlimited liability grow faster the more profitable they are. This suggests that these firms finance their growth mostly internally by investing their profits into the firm. The variable measuring leverage obtains mixed results in the two groups. The results suggest that an increase in leverage inhibits growth in limited liability firms. Unlimited liability firms on the other hand seem to benefit from an increase in leverage. These results could be interpreted to mean that limited liability firms more often raise their leverage to a level, where risk taking is excessive and starts to hinder growth. The firms with an unlimited liability legal form are the only ones to benefit from subsidies in terms of more rapid growth.

When ownership is concerned, we find that an increase in management ownership increases growth rates in the group of limited liability firms and that an increase in family

ownership is associated with lower growth rates in both groups. These results are intuitive and mostly in line with our results above. The only difference is that management ownership does not have an effect on the growth rates of unlimited liability firms. This could mean that management is not willing to boost risk taking under unlimited liability. The differences in the observed values for the coefficients on the two groups are also statistically significant for this variable. Finally, the results for both subgroups suggest that firms with more lending banks have lower growth rates. This result, too, is well in line with the lending relationship literature and suggests that firms benefit from close lending relationships. Overall, the results in column II of table 4 indicate that the model does a better job in capturing the growth determinants of the firms that operate under unlimited liability.

### **5. Determinants of firm growth in manufacturing versus non-manufacturing firms**

Previous studies suggest that the determinants of firm growth may be different for manufacturing versus non-manufacturing firms. E.g., Almus and Nerlinger (1999) find that the determinants of growth are different in innovative and non-innovative firms. Harhoff et al. (1998) investigate firm growth separately for firms in the manufacturing, construction, trade and service industries. The results suggest that the impacts of different growth factors are slightly different in the selected industries.

The results in table 5 suggest that the determinants of growth are to some extent different in manufacturing firms as opposed to non-manufacturing firms in our sample of small and micro firms. It seems that Gibrat's law holds for manufacturing firms whereas it is rejected for non-manufacturing firms.

An increase in profitability improves growth only in manufacturing firms, suggesting that these firms use internally generated funds to finance growth. An increase in the debt to assets ratio increases growth for manufacturing firms and decreases growth for non-manufacturing firms. The fact that the firm has been subsidized by a government agency results in slower growth for the manufacturing firms. Being a parent company enhances growth for manufacturing firms but decreases growth for non-manufacturing firms. This may indicate that there may be economies of scale to be achieved in manufacturing, but that this is not the case in more

labor intensive service industries. We also test for the equality of coefficients in the two sectors. We find that the coefficients on profitability, debt to total assets and subsidiary are statistically significantly different in the two sectors.

### **Table 5**

The results on ownership and relationship lending effects, too, are different for manufacturing versus non-manufacturing firms. While the results indicate that an increase in family ownership decreases profitability in both industry classes, they also indicate that an increase in managerial ownership enhances growth only in manufacturing firms. The difference in managerial ownership in the two sub groups is also statistically significant. Furthermore, relationship lending seems to enhance growth only for the non-manufacturing firms. This results, too, is statistically significant. The results on the relationship lending variable may imply, that it is easier for banks to monitor manufacturing firms and that these firms therefore receive no extra benefits from close bank-borrower relationships.

## **6. Conclusion**

This study investigates the determinants of growth in a sample of small and micro Finnish firms. Firm growth is examined on a number of firm specific and relationship lending characteristics. The data set provides an excellent opportunity for investigating the effects that firm specific factors have on firm growth. This paper is the first one to investigate the relationship between firm growth and relationship lending variables. We are also able to provide new information on the role that legal form has on firm growth by using more detailed ownership variables.

The results on relationship lending effects suggest that an increase in the number of lending banks decreases growth rates in the larger firms and that an increase in the number of banks operating in the county where the firm is located enhances growth of the larger firms and decreases growth rates of the smaller firms. It could therefore be argued that close lending relationships enhance growth for all firms, but that only the larger firms in our sample benefit from more competitive banking markets. When we differentiate between manufacturing and non-

manufacturing firms we find that close bank-borrower relationship enhance growth only for non-manufacturing firms. This implies that it is easier for banks to monitor manufacturing firms.

On results concerning the role that legal form has on growth differ from those in previous studies. The results of our primary models suggest that legal form has no impact on growth. When we run the models without our ownership variables, we obtain a significant coefficient on legal form. This might suggest that legal form can be seen as a proxy for a much more complicated ownership-growth relationship.

The results on firm age confirm previous findings by suggesting that younger firms grow faster than older firms. We measure firm size by adding a quadratic size variable to the model. Our results suggest that the growth rate initially increases with firm size but then starts to decrease after a certain level. When we separate the sample into firms with more than ten employees and those with less than ten employees, we find that the results are significant only for the smaller firms. Therefore, we are not able to reject Gibrat's law for the firms with more than 10 employees. Also, when the sample is separated into manufacturing and non-manufacturing firms, we are able to reject Gibrat's law only for manufacturing firms. A number of other firm characteristics also turn out to be significant determinants of firm growth. We find that increases in profitability increases growth rates in the smaller firms with less than 10 employees and in non-manufacturing firms. The results also indicate that parent companies grow faster and subsidiaries slower than the independent firms in the sample. Finally, it seems that the firm specific variables included in our model are most useful in determining growth rates for firms with less than ten employees and firms that operate under unlimited liability legal form.

The results suggest that relationship lending effects and the ownership structure of the firm are important determinants of firm growth. Bank-borrower relationships enhance growth mostly for the larger firms in the sample and for the non-manufacturing firms and competitive local banking markets benefit only the larger firms in our sample.

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**Table 1**  
**Firm growth by industry, size and legal form**

<i>Industry</i>	<i>Total sample</i>	<i>Employees &lt; 10</i>	<i>Employees ≥ 10</i>	<i>Limited liability</i>	<i>Unlimited liability</i>
Construction (11%)	8.1 % (19.9)	6.2 % (0.203)	11.3 % (0.186)	10.1 % (0.191)	1.7 % (0.213)
Manufacturing (34%)	7.9 % (16.7)	8.3 % (0.199)	7.9 % (0.135)	8.7 % (0.170)	5.1 % (0.158)
Transportation (4%)	10.8 % (17.4)	9.9 % (0.153)	12.7 % (0.221)	13.8 % (0.199)	4.8 % (0.076)
Wholesale and retail trade (27%)	6.3 % (13.0)	5.5 % (0.120)	9.2 % (0.160)	6.7 % (0.121)	5.8 % (0.144)
Utilities (3%)	7.4 % (12.1)	8.8 % (0.139)	6.3 % (0.084)	5.9 % (0.072)	10.2 % (0.181)
Real estate services (16%)	9.7 % (21.7)	7.8 % (0.189)	14.3 % (0.212)	10 % (0.224)	6.9 % (0.134)
Hotels and restaurants (2%)	3.0 % (7.5)	4.4 % (0.055)	6.6 % (0.086)	3.3 % (0.091)	2.5 % (0.049)
Other industries (3 %)	0.6 % (0.026)	0.7 % (0.105)	4.7 % (0.048)	7.8 % (0.083)	-0.09 % (0.093)
Total	7.6 % (0.170)	7 % (0.170)	10 % (0.160)	9 % (0.170)	5 % (0.150)

**Table 2**  
**Descriptive statistics on key variables**

Column I presents descriptive statistics for the total sample, column II splits the data into firms with less than or more than ten employees. Column III splits data into limited liability firms and unlimited liability firms. The differences of the means between the groups in columns II and III is investigated through t-test. Statistical significant difference of means: \*\*\* denotes statistically significant difference of means at the 1 % level, \*\* at 5 % and \* at 10 %.

Variable	I	II		III		IV	
	Total sample	# of employees < 10	# of employees ≥ 10	Limited liability	Unlimited liability	Manu- facturing firms	Non manu- facturing firms
	Mean (st.dev)	Mean (st.dev)	Mean (st.dev)	Mean (st.dev.)	Mean (St. dev.)	Mean (St. dev.)	Mean (St. dev.)
Growth rate	7.6 % (0.17)	7 % (0.17)	10 %*** (0.16)	9 % (0.17)	5 %*** (0.15)	7.9 % (0.17)	7.5 % (0.17)
Total assets	34336 (242206)	1694 (3425)	74249*** (359793)	43095 (275017)	5451*** (39877)	39962 (132045)	31227 (297293)
Number of employees	32 (132)	4 (2)	82 (211)	43 (156)	8*** (43)	56 (197)	18*** (68)
Firm age (natural log)	2.29 (1.07)	2.16 (0.98)	2.53*** (1.17)	2.20 (1.1)	2.49*** (0.95)	2.32 (1.13)	2.28*** (1.03)
Debt to assets	78 % (1.38)	74 % (0.76)	77 % (0.25)	78 % (1.45)	78 % (1.11)	73 % (0.79)	81 % (1.67)
Bank has rejected loan application	38 % (0.48)	35 % (0.48)	43 %*** (0.49)	38% (0.48)	38 % (0.49)	44 % (0.49)	34 %*** (0.47)
Operating profit margin	7.3 % (0.16)	8 % (0.16)	6 %** (0.15)	6 % (0.15)	13 %*** (0.18)	9.1 % (0.19)	5.9 %*** (0.13)
Urban location dummy	47 % (0.50)	43 % (0.50)	56 %*** (0.50)	54 % (0.50)	34 %*** (0.47)	39 % (0.49)	52 %*** (0.50)
Number of banks in the county	4.62 (1.42)	4.54 (1.43)	4.79*** (1.40)	4.77 (1.42)	4.29*** (1.38)	4.45 (1.42)	4.73* (1.42)
Length of lending relationship	7.5 (11.0)	7.2 (10.03)	8.0*** (12.63)	6.9 (10.72)	8.69*** (10.72)	7.3 (10.79)	7.5 (10.87)
Bank switch	19 % (0.39)	17 % (0.38)	21 %** (0.41)	20 % (0.40)	16 %* (0.37)	21 % (0.41)	17 %*** (0.38)
Number of lending banks	0.89 (0.87)	0.79 (0.74)	1.03*** (1.01)	0.88 (0.93)	0.92 (0.73)	0.89 (0.85)	0.90 (0.89)
Family ownership	54 % (47.4)	58 % (47.1)	48 %*** (47.39)	48 % (47.12)	70 %*** (44.44)	56 % (47.58)	54 % (47.31)
Management ownership	61 % (42.2)	67 % (40.2)	49 %*** (43.16)	54 % (41.55)	74 %*** (40.40)	61 % (42.01)	60 % (42.40)
Parent company	6 % (0.23)	1 % (0.11)	14 %*** (0.34)	8 % (0.27)	1 %*** (0.09)	8 % (0.27)	4 %*** (0.20)
Subsidiary	11 % (0.31)	5 % (0.23)	20 %*** (0.40)	15 % (0.36)	1 %*** (0.09)	14 % (0.34)	9 %*** (0.29)
Subsidiaries	55.79 (912)	23.02 (424)	117.72*** (1429)	76.92 (1101)	8.76* (103)	129.16 (1462)	13.30*** (259)
Limited liability legal form	69 % (0.46)	58 % (0.49)	88 %*** (0.32)	-	-	74 % (0.44)	66 %*** (0.47)

**Table 3****The determinants of firm growth by firm size**

The dependent variable is the average annual growth rate from a four year period between 1994 -1997. Column I presents the results for the total sample, column II splits the data into firms with less than or more than ten employees. Column III splits data into limited liability firms and unlimited liability firms.

	Column I		Column II		Column III	
	Total sample		Employees $\geq$ 10		Employees < 10	
	Coefficient	<i>p</i>	Coefficient	<i>p</i>	Coefficient	<i>p</i>
Constant	-0.010	0.873	0.192	0.179	-0.276	0.049
<i>Firm characteristics</i>						
Ln (Total assets)	0.034	0.012	-0.167	0.572	0.140	0.001
Ln (Total assets) squared	-0.001	0.055	0.000	0.743	-0.010	0.001
Ln (1+ firm age)	-0.033	0.005	-0.014	0.022	-0.058	0.000
Operating profit/sales	0.039	0.165	0.023	0.516	0.099	0.021
Urban location	0.019	0.120	0.023	0.165	0.014	0.431
Financially constrained	0.008	0.414	-0.013	0.307	0.025	0.073
Debt to total assets	-0.013	0.000	0.046	0.075	0.014	0.398
Limited liability firm	-0.006	0.619	-0.011	0.623	-0.017	0.256
Subsidized	0.000	0.796	0.000	0.837	0.000	0.603
Parent company	0.000	0.987	-0.024	0.141	0.158	0.001
Subsidiary	-0.025	0.072	-0.017	0.273	-0.009	0.718
<i>Ownership</i>						
Family ownership	-0.0005	0.000	-0.0001	0.840	-0.001	0.000
Management ownership	0.0003	0.060	0.000	0.869	0.001	0.013
<i>Relationship lending</i>						
# of lending banks	-0.016	0.003	-0.016	0.026	-0.007	0.480
# of banks in county	-0.003	0.531	0.011	0.058	-0.012	0.039
Bank change	0.004	0.681	-0.005	0.693	0.007	0.676
<i>Industries</i>						
Manufacturing	0.043	0.098	-0.015	0.716	0.049	0.141
Utilities	0.046	0.186	0.028	0.616	0.124	0.007
Construction	0.049	0.093	0.002	0.960	0.033	0.395
Trade	0.023	0.365	-0.035	0.396	0.042	0.194
Hotels and Restaurants	0.001	0.972	-0.046	0.415	-0.022	0.584
Transportation	0.050	0.107	-0.039	0.460	0.058	0.127
Real Estate	0.018	0.495	-0.025	0.580	0.036	0.287
Adjusted R <sup>2</sup>	0.093		0.079		0.172	
Number of observations	1353		642		697	
F-test statistics	7.362	(0.000)	3.385	(0.000)	8.237	(0.000)

**Table 4**  
**The determinants of firm growth by legal form**

The dependent variable is the average annual growth rate from a four year period between 1994-1997. Column I presents the results for limited liability firms and column II for unlimited liability firms.

	Limited liability		Unlimited liability	
	Coefficient	<i>p</i>	Coefficient	<i>p</i>
Constant	0.171	0.002	-0.068	0.345
Firm characteristics				
Ln (Total assets)	0.005	0.123	0.022	0.003
Ln (1+ firm age)	-0.027	0.000	-0.050	0.000
Operating profit/sales	0.013	0.707	0.210	0.000
Urban location	0.015	0.304	0.030	0.194
Financially constrained	0.008	0.493	0.007	0.671
Debt to total assets	-0.015	0.000	0.026	0.099
Subsidized	0.000	0.934	0.004	0.000
Parent company	0.006	0.745	-0.083	0.309
Subsidiary	-0.022	0.134	0.151	0.111
Ownership				
Family share ownership	-0.0004	0.002	-0.001	0.012
Management ownership	0.0003	0.037	0.0001	0.610
Relationship				
# of lending banks	-0.019	0.002	-0.033	0.008
# of banks in county	-0.004	0.399	0.006	0.448
Bank change	0.008	0.535	-0.008	0.695
Industries				
Manufacturing	-0.023	0.606	0.087	0.009
Utilities	-0.028	0.635	0.071	0.188
Construction	-0.027	0.595	0.150	0.000
Trade	-0.051	0.234	0.112	0.001
Hotels and Restaurants	-0.075	0.161	0.049	0.249
Transportation	-0.009	0.859	0.072	0.088
Real Estate	-0.048	0.278	0.058	0.157
Adjusted R <sup>2</sup>	0.077		0.265	
Number of observations	1 045		307	
F-test statistics	5.463	(0.000)	5.142	(0.000)

**Table 5****The determinants of firm growth in manufacturing and non-manufacturing firms**

The dependent variable is the average annual growth rate from a four year period between 1994 -1997. Column I presents the results for manufacturing firms and column II for non-manufacturing firms.

	Manufacturing firms		Non-manufacturing firms	
	Coefficient	<i>p</i>	Coefficient	<i>p</i>
Constant	-0.012	0.817	0.153	0.000
Firm characteristics				
Ln (Total assets)	0.006	0.261	0.010	0.015
Ln (1+ firm age)	-0.031	0.000	-0.029	0.000
Operating profit/sales	0.075	0.006	0.006	0.726
Urban location	-0.001	0.973	0.022	0.159
Financially constrained	0.020	0.190	0.007	0.582
Debt to total assets	0.072	0.004	-0.015	0.000
Subsidized	-0.069	0.003	0.041	0.156
Parent company	0.055	0.022	-0.048	0.039
Subsidiary	-0.035	0.112	-0.011	0.529
Ownership				
Family share ownership	-0.0001	0.008	-0.001	0.004
Management ownership	0.0001	0.029	0.0001	0.451
Relationship				
# of lending banks	-0.006	0.496	-0.025	0.000
# of banks in county	0.005	0.503	-0.009	0.113
Bank change	0.006	0.672	-0.010	0.355
Adjusted R <sup>2</sup>	0.148		0.131	
Number of observations	555		804	
F-test statistics	5.637	(0.000)	8.320	(0.000)

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<sup>1</sup> A social insurance premium of at least 25 percent is added to the wages; Source: Statistics Finland

<sup>2</sup> We do not report these results because the adjusted  $R^2$  is much smaller for the models without the ownership variables.

<sup>3</sup> We run these tests with two alternative methods suggested in the literature. First we run the model in OLS with multiplicative dummies allowing for interaction between the dummy variable for manufacturing and all the independent variables in the model. We also estimate the model in GLM with the manufacturing firm dummy as the fixed factor. The results are similar in both estimations.

<sup>4</sup> We also run the models with a non-linear specification of the size variable introduced in chapter 3, but do not obtain a significant coefficient.