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## Leasing by small enterprises

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Working Paper No. 122

**Leasing by small enterprises**

by

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Wirtschafts- und Sozialwissenschaftliche Fakultät  
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2012

# **Leasing by small enterprises**

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## **Abstract**

Using internal data of a leasing company in Germany, we examine the determinants of the probability and use of leasing by small firms. We find that small and young firms are likely to be constrained on the leasing market but use leasing to increase their debt capacity. Beyond contract- and firm-specific characteristics, demographic and socio-economic characteristics of the entrepreneur matter. Older and higher qualified entrepreneurs have easier access to leasing than those who are younger or non-educated, but the latter lease more than highly educated entrepreneurs. Female and non-married entrepreneurs of young firms use leasing to increase their debt capacity. These results are important for aging populations where the financing of entrepreneurial activities by highly qualified, older and female persons are important to sustain growth.

JEL classification: D23, D92, G21, G31, G32, J14, J16

Keywords: leasing, financial constraints, small firm finance, capital structure, aging population

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## **I. Introduction**

Leasing is an alternative to bank loans with growing importance for the financing of small and medium sized enterprises (SMEs) in Europe. In Germany, leasing is the most important source of external finance. Almost half of the externally financed capital investments are financed through leasing, and 85% of leasing customers are small and medium-sized enterprises (KfW, 2011). The growing use of leasing can be explained by its effects of generating liquidity, releasing equity capital and improving accounting ratios. Firms may thus improve their credit rating, gaining better access to bank loans. Because of the growing use of credit ratings in bank lending in recent years, the equity ratio of a firm has become more and more important for its access to bank loans and loan terms. Consequently, SMEs that traditionally relied on internal finance and bank loans have been compelled to look for alternative financial instruments. Beyond financial leasing, leasing institutions often offer services such as administration, machinery management, debit management or advice, which help small firms to profit from advantages of specialization (KfW, 2006).

Leasing is an instrument of investment finance through which the legal ownership of the good is dissociated from its economic ownership. Contrary to a classical bank loan, the lessor remains the owner of the asset. Because of this ability to repossess, a lessor can implicitly extend more credit than a lender whose claim is secured by the same asset. Therefore, leasing has a higher debt capacity than secured lending, making it especially valuable to financially constrained firms. However, the separation between ownership and control of a leased asset involves agency costs that have to be traded off against the benefits of higher debt capacity (Eisfeldt and Rampini, 2009). While banks evaluate borrowers according to their ability to repay the loan (borrower rating), leasing companies also evaluate potential leasing assets to assess whether their use improves the lessee's profitability (object assessment). Therefore, a firm may finance an investment by leasing, even if it is credit rationed (KfW, 2006).

According to the mobility of the leased assets, leasing operations are classified into mobility leasing (automobiles, machines, plants, and computer equipment, among others) and property leasing (offices, production or inventory buildings). In Germany, the most important form of leasing is mobility leasing, which accounted for about 87% of the total leasing volume in 2005 (KfW, 2006). Leasing may be provided directly by the producer of the assets for lease or indirectly by a leasing company that is often related to the producer or a bank. In Germany, about 50% of new mobile leases are provided by producer-related leasing companies, 40% by bank-related leasing companies and 10% by independent leasing companies (KfW, 2006).

Empirical studies show that the use of leasing in the U.S. and Europe depends on firm-specific characteristics such as size, age, leverage, probability of bankruptcy, profitability, ownership structure, investment opportunity sets and tax variables (e.g. Eisfeldt and Rampini, 2009; Haunschild, 2004; Deloof and Verschueren, 1999; Adams and Hardwick, 1998; Lasfer and Levis, 1998; Sharpe and Nguyen, 1995). Most studies focus on medium-sized or larger firms, neglecting smaller ones. In the case of a micro or small firm<sup>1</sup>, which is managed by its owner, the profitability and probability of bankruptcy may depend not only on the characteristics of the firm but also on socio-economic and demographic characteristics of the entrepreneur, such as age, education, gender and family status. In aging populations with a declining share of entrepreneurially active people, the financing of start-ups by older, female or less wealthy people becomes important to maintain growth. If special demographic groups have difficulties accessing bank loans because they are rated as comparatively risky, the use of leasing may overcome financial constraints. This motivates us to examine, for the first time, the influence of entrepreneurial characteristics on leasing by small firms. We find that both the probability and use of leasing depend on characteristics of the financial contract, the

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<sup>1</sup> A microenterprise (a small enterprise) is defined as an enterprise which employs fewer than 10 (10-50) persons, and whose annual turnover and/or annual balance sheet total does not exceed EUR 2 million (EUR 2-10 million). (Commission of the European Communities, 2003, p. 39).

firm and the entrepreneur. Our study is based on data of mobility leasing by a bank-related leasing company in Germany.

The paper is structured as follows. Section II provides an overview of the literature and testable hypotheses. Section III describes the data, measurement and descriptive statistics. The results of multivariate analyses are presented and discussed in Section IV, while Section V concludes.

## **II. Literature Review and Hypotheses**

The literature on financial leasing explains the use of leasing in three main ways.

(1) Tax differentials between lessee and lessor: transfer of tax shields from firms that cannot fully utilize the tax deduction (lessees) to firms that can (lessors). Therefore, firms with low marginal tax rates are expected to lease more.

(2) Debt substitutability: leasing may be a substitute for bank loans, because it reduces debt capacity. However, it has a higher debt capacity than secured lending, because the lessors have first claim on the asset leased and the greater ability to repossess the asset preserves capital. Therefore, leasing is likely to be advantageous for financially distressed, debt constrained firms.

(3) Agency costs: The use of leasing may reduce agency costs of the separation between ownership and control in larger companies, because leasing is not an investment decision and lessors have first claim over the asset (Lasfer and Levis, 1998). However, the separation between ownership and control of the leased asset involves agency costs even in smaller, owner-controlled firms (Eisfeldt and Rampini, 2009).

Empirical studies have examined the determinants of leasing in the U.S. (Eisfeldt and Rampini, 2009; Sharpe and Nguyen, 1995; Ang and Peterson, 1984), the United Kingdom (Adams and Hardwick, 1998; Lasfer and Levis, 1998), Belgium (Deloof and Verschueren,

1999) and Germany (Haunschild, 2004). They show that the use of leasing depends on firm characteristics (e.g. size, age, profitability, investment opportunity sets, taxation), financial policy and default probability or financial distress. Table 1 provides an overview of the results. While the evidence is mixed, it indicates that the leasing volume depends negatively on firm size, dividends and cash flow but positively on the expected costs of financial distress.

Most studies are based on financial statement data and focus on larger, listed companies. Only Lasfer and Levis (1998) differentiate between small and large firms and find that for small firms, leasing is driven by growth opportunities (rather than tax advantages) and helps small companies to survive. Less profitable small firms lease more often than cash-generating ones, and small firms that lease have lower bank debt than small firms that do not lease. These results support the hypothesis that leasing helps to overcome credit rationing of less profitable small firms.

**Table 1. Overview of previous studies on the determinants of leasing**

	Ang and Peterson (1984)	Deloof and Verschuere (1999)	Eisfeldt and Rampini (2009)		Graham et al. (1998)		Haunschild (2004)	Lasfer and Levis (1998)	Sharpe and Nguyen (1995)	
<b>Data and method</b>	U.S., Standard and Poors, Tobit	Belgium, panel Tobit	U.S., Compustat/Census of Manufactures, panel OLS		U.S., Compustat, panel Tobit		Germany, survey, Logit	UK, Logit	U.S., Compustat, Tobit, Logit	
<b>Dependent variable</b>	leases/book value of equity	financial leases/ total assets	rental payments/ total cost of capital services	rental payments/ rental payments+capital expenditures	capital leases/market value	operating leases/market value	probability of leasing	probability of leasing	capital leases/ fixed assets	Total lease share of total capital costs
<b>Independent variables</b>										
Firm characteristics										
profitability	neg. *	n. sig.						n.sig.		
sales or profit variability	n. sig.	pos.***					n. sig.		n.sig.	neg.***
(expected) growth	n. sig.	n. sig.			neg. ***	neg. ***	pos.**	pos.*	n. sig.	n.sig.
size	n. sig.	pos. **/***	neg. **/***	neg. **/***	neg. **	neg. ***	pos***	pos.*	pos.**	neg.***
current assets		neg. ***								
(fin.) fixed assets		neg. **/***			pos.***	pos.**				
liquidity	n. sig.									
dividends			neg. ***	neg. ***					neg.**	neg.***
cash flow			neg. */**/***	neg. ***					pos.***	neg.***/n.sig.
tax rate			n. sig.	n. sig.	n. sig.	neg.***		n.sig.	neg.**	neg.***/n.sig.
age			n. sig.	n. sig. / neg. *			neg. **			
industry					neg. ***	neg. ***	n. sig			
legal form							n. sig			
location: West Germany							n. sig			
Financial policy										
Debt equity ratio	pos.*									
Long-term debt/total assets		neg. ***	n. sig.	pos. */***				pos.*		
Long-term bank debt/total assets		neg. **/ n.sig.								
Financial distress										
High debt rating									n. sig.	neg.***
Expected costs of financial distress					pos. ***	pos. ***				
Ex post financial distress					n. sig.	n. sig.				

Source: Own compilation; Notes: significance levels: \*\*\* significant at 1% level; \*\* significant at 5% level; \* significant at 10% level;



To the best of our knowledge, only Haunschild (2004) examined the use of leasing for German firms using a multivariate analysis. For 303 observations based on a survey of firms of all size classes, she found that the probability of leasing increases with firm size and growth but decreases with firm age. Other firm characteristics, such as variability of sales, legal form, industry and location in West Germany, did not show a significant influence. The results support the hypothesis that young and growing firms are more likely to lease, because they have higher default risk and are more often credit constrained. As main motives for leasing, the respondents indicated release of capital and higher financial scope; tax savings were less important (Haunschild, 2004). Main motives against leasing were sufficient supply of alternative financing possibilities, high costs of leasing and the preference of entrepreneurs to possess legal ownership of the assets. This is consistent with the pecking order theory of optimum capital structure (Myers and Majluf, 1984). This theory states that according to a hierarchy of agency costs, firms use internal funds before taking loans, take loans before leasing, and lease before using more expensive forms of finance, with external equity being the most expensive. This has been confirmed by Theurl (2010), who found that for German firms, leasing is the second most important form of external finance after bank loans.

None of the previous studies examined whether leasing depends on characteristics of the entrepreneur. We expect that in the case of small firms, profitability and default risk depend not only on firm characteristics but also on personal characteristics of the owner-manager or managing director. Entrepreneurs with lower success probability are less likely to pay leasing and loan rates and therefore present higher risks. Empirical studies on lending to consumers or micro and small enterprises show that socio-economic and demographic characteristics of the borrower affect loan access

and loan terms. While the evidence on discrimination against female borrowers is mixed (Barasinska and Schäfer, 2010; Alesina *et al.*, 2008; Ravina, 2008, Pope and Sydnor, 2008; Blanchflower *et al.*, 2003; Cavalluzzo *et al.*, 2002), there is ample evidence on discrimination of ethnic entrepreneurs on loan markets, especially in the U.S. (e.g. Blanchflower *et al.*, 2003; Cavalluzzo and Wolken, 2005; Bruder *et al.*, 2011). In Germany, older borrowers seem to be discriminated in loan markets (Reifner, 2005; Engel *et al.*, 2007).

Credit and leasing institutions test the credit or leasing worthiness of their customers internally or use credit ratings from external credit agencies. Therefore, we expect that like bank loans, the supply of leasing depends negatively on expected default risk measured by ratings or observable risk. On the other hand, risky borrowers are likely to demand more leasing, because they are credit rationed by banks and leasing has a higher debt capacity. In this case, we expect a positive relationship between expected default risk and the use of leasing.

To examine the determinants of the risk and use of leasing, we formulate the following hypotheses:

H1: The expected quality (rating) of the lessee depends positively on observable characteristics of the firm or the entrepreneur indicating low default risk.

H2: The use of leasing depends positively on the expected quality (rating) of the lessee (risk hypothesis).

H3: The use of leasing depends positively on characteristics of the firm or entrepreneur indicating high default risk (credit rationing or debt capacity hypothesis).

### **III. Data, Measurement and Descriptive Statistics**

Our analysis is based on a 1998 dataset comprising 3600 requests of commercial customers for mobility leasing (automobiles, trucks, machines, medical equipment, computer equipment etc.) at a large bank-related leasing company in Germany. The data were provided by Informa Baden-Baden. The dataset refers to small firms whose unsecured risk did not exceed 100 000 DM (51 129 EUR) at the time of the leasing decision. It comprises information on socio-economic characteristics of the managing director such as age, gender, marital status, learned profession and the federal state where he or she lives. Firm-specific information refers to legal form, firm size and firm age, among others. About 17% of the observations refer to young firms that are not older than two years. This allows us to compare leasing requests of younger and older firms.

#### **Dependent variables**

To test hypothesis H1, we use the quality measure internal rating as the dependent variable. This variable measures whether the leasing request was rejected or the lessee's quality was rated as good or bad by the lessor. We find that 67% of the cases are good lessees; 17% are bad lessees; and 15% of the leasing requests were rejected. The determinants of the lessee's quality are examined by an ordered probit regression, where the quality index takes equals 1 if the request was rejected, 2 if the lessee received a bad rating, and 3 if the lessee received a good rating.

To test hypotheses H2 and H3, we use ratios indicating the extent of leasing use. Following previous empirical studies, the use of leasing is measured by the ratio of the total leasing exposure to fixed assets and the ratio of total leasing exposure to property, plant and equipment. The determinants of the use of leasing are examined by a tobit regression.

## **Independent variables**

To examine the influence of various independent variables on the dependent variables, we group the independent variables into several blocks measuring the risk of the lessee. The regressions were performed for the whole dataset, the subgroup of young firms (not older than two years) and the subgroup of established firms (older than two years). This allows us to identify possible financing problems of young firms.

The first group of independent variables comprises contract-specific variables: duration of the contract, type of contract, type of leased asset and cost of acquisition of the leased asset. These variables are expected to influence the leasing risk and thus the probability of a good or bad rating.

In the present dataset, the mean duration of the contract is 3.6 years. Longer-term contracts are likely to imply higher risk because of a higher financial distress probability. Similarly, higher cost of acquisition implies higher risk, because the lessor may lose more. The mean cost of acquisition is 57 000 DM (29 144 EUR). Contracts with full amortization (11% of the cases) are less risky for the lessor than contracts with partial amortization (71% of the cases), because the leased asset does not have to be reused for another purpose. We find that 18% of the lessees chose the option of hire purchase. The classical object of mobility leasing is automobile leasing; 55% of the lessees used leasing to finance an automobile or truck. The specific risk of this leasing purpose depends on the above named contractual variables (cost of acquisition, duration, contract type).

The second group of independent variables comprises firm-specific variables: firm size measured by the number of employees, firm age measured in years, industry

affiliation, legal form, entry in the commercial register, and number of managers. These variables are also likely to influence leasing risk. Following the theoretical and empirical literature on lending to SMEs, we expect default risk to depend negatively on the size and age of the firm. Larger firms may be more diversified, and older firms may have more experience in their markets. Lower default risk implies a higher leasing quality and thus a higher probability to obtain a leasing contract. In the present sample, the mean number of employees is 15. The legal form may also influence risk. Incorporated firms are likely to be perceived as riskier because of their limited liability. Moreover, there are industry-specific risks that may be related to the business cycle; therefore, a distinct correlation between risk and industry sector cannot be inferred. Firms with an entry in the commercial register and firms with more than one manager are likely to be less risky than non-registered firms or sole proprietorships. A larger number of managers may help to combine different competencies and to share responsibility. The mean number of managers is 1.6.

Going beyond previous studies on the determinants of leasing, we include for the first time demographic variables as a third group of independent variables: age, level of education, gender and marital status of the entrepreneur (managing director). The expected influence of age on the risk and use of leasing is ambiguous. On the one hand, older entrepreneurs are likely to have more experience and knowledge; on the other hand, they have higher risk of illness or mortality. At the beginning of a long-term financial contract it is uncertain how long they will remain in business and whether sufficient time will remain to amortize the investment project. Therefore, older borrowers face financial constraints on loan markets in Germany (Reifner, 2005; Engel *et al.*, 2007). In the present sample, the mean age of the entrepreneurs is 44.3 years.

A higher level of education is likely to reduce leasing risk. In the present sample, almost 20% of the entrepreneurs have no education at all, while few have a master craftsman degree and few have an academic profession. The large share of lessees without education may indicate that these are credit rationed by banks and therefore seek to finance their investment projects through leasing.

The expected influence of gender on the risk and use of leasing is ambiguous. Evidence for traditional credit markets finds discrimination against female borrowers or no discrimination at all (Alesina *et al.*, 2008; Cavaluzzo *et al.*, 2002; Blanchflower *et al.*, 2003). Evidence for the largest U.S. peer-to-peer lending platform shows that women are more likely to obtain funds than men (Ravina, 2008; Pope and Sydnor, 2008). In contrast, gender does not affect loan access on the largest German peer-to-peer lending platform (Barasinska and Schäfer, 2010).

Empirical evidence shows that married entrepreneurs tend to take lower investment risks than non-married entrepreneurs. Therefore, we expect a positive influence of the marital status variable on the quality and use of leasing. In the present sample, 80% of the entrepreneurs are married.

Beyond these personal characteristics of the entrepreneur, the group of demographic variables includes the region where the enterprise is located. Comparable studies on bank lending to SMEs show that firms located in East Germany represent a higher credit risk than those located in the richer regions of West Germany (Lehmann *et al.*, 2004). Moreover, we expect that demographic change involves higher economic risks in East Germany than in West Germany. According to ZDWA (2006), there is a positive net migration from East to West Germany in the 18 to 49 age group. This implies that the East German population declines more rapidly than the West

German population (KfW, 2009), because the fertility is nearly the same in both regions and traditionally slightly higher in East Germany (MPI, 2010). Therefore, enterprises in East Germany face a higher shortage of skilled workers and are exposed to higher risks than those located in West Germany.

As further risk measures, we include the lessee's internal rating and the number of bank relationships as independent variables. We expect that a lessee who has already borrowed from several banks represents a higher leasing risk.

The definition of the variables and the descriptive statistics are presented in Table 2.

**Table 2. Definition of variables and descriptive statistics**

Variable name	Definition	N	Min	Max	Me-dian	Mean	Std. dev.	Variance
<b>Contract-specific variables</b>								
duration	Duration in years	3532	1.0	8.25	3.58	3.58	0.823	0.680
contract_type	Set of dummies for type of contract	3539						
	1: partial amortization		0	1	0	0.107	0.309	0.095
	2: total amortization		0	1	1	0.717	0.451	0.203
	3: hire purchase		0	1	0	0.176	0.381	0.145
leasing_object	Set of dummies for leasing object	3533						
	1: machines, plants, computer		0	1	0	0.152	0.359	0.129
	2: automobiles		0	1	0	0.342	0.475	0.225
	3: trucks and construction machines		0	1	0	0.209	0.406	0.165
	4: others		0	1	0	0.297	0.457	0.209
cost	Cost of acquisition in thousand DM	3543	3.2	864	45.7	57.0	51.5	2650
<b>Firm-specific variables</b>								
size	Number of employees	2850	0	500	5	15.2	41.1	1688
	Set of dummies for number of employees	2850						
	1: sole entrepreneur		0	1	0	0.105	0.306	0.094
	2: 1 further employee		0	1	0	0.134	0.341	0.116
	3 : 2 - 5 employees		0	1	0	0.321	0.467	0.218
	4: 6 - 10 employees		0	1	0	0.160	0.367	0.135
	5: 11 - 50 employees		0	1	0	0.224	0.412	0.174
	6: more than 50 employees		0	1	0	0.055	0.227	0.052
industry	Set of industry dummies	2879						
	1: Miscellanea		0	1	0	0.095	0.294	0.863
	2: Chemical industry		0	1	0	0.128	0.334	0.112
	3: Wholesale and resale trade		0	1	0	0.173	0.378	0.143
	4:Transport sector and communications		0	1	0	0.104	0.305	0.093
	5: Restaurants and hotels		0	1	0	0.192	0.394	0.155
	6: other services		0	1	0	0.307	0.461	0.213
legal	Legal form: dummy = 1, if firm is incorporated, = 0 otherwise	3130	0	1	0	0.342	0.474	0.225
commercial	Dummy = 1, if firm has an entry in the commercial register, = 0 otherwise	3544	0	1	1	0.564	0.496	0.246
nb_managers	Number of managers	3436	1	12	1	1.63	1.32	1.74
firm_age	Age of the firm	3139	1	198	7	11.9	16.1	259
	Set of dummies for age of the firm							
	1: less than 2 years		0	1	0	0.173	0.379	0.143
	2: 2-5 years		0	1	0	0.221	0.415	0.172
	3: 6-10 years		0	1	0	0.275	0.446	0.199
	4: more than 10 years		0	1	0	0.331	0.471	0.221
<b>Demographic variables</b>								
	Set of dummies for level of education	2076						
education	1: without education		0	1	0	0.183	0.134	0.018
	2: completed apprenticeship		0	1	0	0.198	0.399	0.159
	3: Master craftsman		0	1	0	0.141	0.348	0.121
	4: business management expert with degree		0	1	0	0.407	0.491	0.241
	5: professional or other degree		0	1	0	0.235	0.424	0.180



marital_status	Marital status: dummy = 1, if managing director is married, = 0 otherwise	2332	0	1	1	0.799	0.401	0.160
gender	Gender: dummy = 1, if managing director is male, = 0 otherwise	3230	0	1	1	0.827	0.379	0.143
region	Location: dummy = 1, if firm is located in West Germany, = 0 otherwise	3384	0	1	1	0.839	0.369	0.135
age_manager	Age of managing director	2764	19	75	43	44.3	10.3	105.6
	Set of dummies for age of managing director							
	1: younger than 30		0	1	0	0.077	0.268	0.071
	2: 30 – 35 years		0	1	0	0.145	0.352	0.124
	3: 35 - 40 years		0	1	0	0.174	0.379	0.144
	4: 40 - 45 years		0	1	0	0.172	0.377	0.142
	5: 45 - 50 years		0	1	0	0.142	0.349	0.122
	6: 50 - 55 years		0	1	0	0.134	0.341	0.116
	7: older than 55 years		0	1	0	0.156	0.363	0.132
<b>Risk variables</b>								
rating	rating index, divided by 100, low = good, high = bad	3078	0	6	2.34	2.47	0.559	0.312
nb_banks	Number of bank relationships: dummy = 1, if the lessee has more than one bank relationships, = 0 otherwise	3544	0	1	0	0.397	0.489	0.239
<b>Dependent variable</b>								
qual_index	Quality index	3544						
	3: good quality		0	1	1	0.670	0.470	0.221
	2: bad quality		0	1	0	0.178	0.383	0.147
	1: request denied		0	1	0	0.151	0.359	0.129
total	Financial liabilities to total assets	1612	0	130	0.44	1.446	5.27	27.8
fixed	Financial liabilities to fixed assets	1605	0	130	0.45	1.460	5.28	27.9

Source: Own calculation.

#### **IV. Results of multivariate analyses**

In a first step, we used ordered probit to estimate the probability that a leasing contract was written. The dependent variable is a quality index that ranges between very high quality of the lessee (a contract is written), middle quality (a contract is still written) to low quality (the request is denied). The results of the regressions are documented in Table 3.

Model I includes all contract-specific variables. The results show that good lessees more often lease automobiles than machines or other assets and are more likely to lease assets with lower cost of acquisition. However, most of the cases refer to automobile leasing.

Model II includes only the firm-specific variables. We find that firm size and age matter. Leasing requests of micro are more often rejected than those of larger firms with more than six employees (consistent with Haunschild (2004)), and firms younger than two years are more often rejected than older ones (contrary to Haunschild (2004)). This supports the evidence for financial restrictions of small and young firms in German credit markets (Lehmann and Neuberger, 2001; Harhoff and Körting, 1998; Elsas and Krahnen, 1998). As in the credit rationing literature, this can be explained by the comparatively high information asymmetry between debtor and creditor. This supports H1 but not H3. Small and young firms do not receive a higher debt capacity through leasing, which does not seem to be a substitute to bank loans. Therefore, they are dependent on internal funds and equity, according to the pecking order theory. Incorporated firms lease more often than unincorporated ones, probably because of larger possibilities to reap tax advantages through financial statements. However, this cannot be shown directly, because the sample does not include financial statement data. The probability to lease also depends on the firm's

industry affiliation. For example, leasing requests from firms in the traffic and communications transmission sector are more often rejected than those from restaurants. The number of managers has a positive influence on the lessee's quality, likely because the risk of default is reduced when competences and skills are shared. However, there seems to be an optimum number of managers, due to possible competence conflicts, as the relationship between number of managers and leasing quality is inversely U-shaped.

Model III includes both groups of independent variables considered so far. The results are qualitatively the same and thus seem to be robust. Model IV includes only the demographic variables. We find that the entrepreneur's educational level is significant. University graduates, such as business management experts, more often receive good ratings than entrepreneurs with a completed apprenticeship. The age of the director-manager has a significant positive influence on the rating and probability to lease. Thus, older entrepreneurs seem to be perceived as lower risks due to their experience. Gender, marital status, region and the number of bank relationships do not influence the lessee's rating.

In a second step, we estimated the use of leasing, measured by the ratio of leasing liabilities to total assets (total) and the ratio of leasing liabilities to fixed assets (fixed). The results of the tobit regressions are documented in Tables 4 and 5. We find the same behaviour for both ratios, and the results hold with small exceptions when looking at the subgroups of young (two years or less) and older firms (more than two years), respectively, which are not separately reported in the tables.

The type of the leasing object and the cost of acquisition significantly influence the use of leasing. Leasing of machines or automobiles involves higher volumes than

leasing of trucks, and the leasing ratio increases with the cost of acquisition. While small and young firms have a smaller probability of leasing than larger and older ones, they show higher leasing ratios. This indicates that such comparatively risky firms that are likely to be credit rationed by banks use leasing to increase their debt capacity, consistent with H3.

Entrepreneurs without education lease higher volumes than business management experts. They are likely to be rated as not creditworthy by banks and therefore may use leasing to increase their debt capacity, consistent with the debt capacity hypothesis H3. However, master craftsmen lease lower volumes than business management experts.

Gender and marital status do not have a significant influence on the use of leasing for the whole sample. However, male and married entrepreneurs of young firms lease lower volumes than female and non-married entrepreneurs. This result is consistent with the hypothesis that female and non-married entrepreneurs are more credit constrained, because they are riskier than male and married entrepreneurs and therefore use leasing to increase their debt capacity (H3).

The use of leasing is higher in West Germany, where default risk and demographic risk tend to be lower than in East Germany; this supports H2. A bad rating, which implies higher risk, has a positive influence on the use of leasing. If this rating is comparable to the credit rating by banks, leasing and loans are substitutes, consistent with H3. Firms with multiple bank relationships have lower leasing ratios, probably because they have enough access to bank loans. This is also consistent with H3. Thus, we find support for both H2 and H3. While leasing seems to increase debt capacity, the use of leasing depends on the lessee's individual risk.

**Table 3. Ordered probit regression for the quality of the firm**

	I	II	III	IV	V	VI
<b>contract specific variables</b>						
(ln) duration	-0.048		0.001			-0.056
	-0.540		0.010			-0.300
contract_type	n.sign.		n.sign.			n.sign.
leasing_object						
machines etc.	-0.014		0.114			0.082
	-0.180		1.090			0.500
automobiles	0.412 ***		0.303 ***			0.263 *
	6.290		3.560			1.900
trucks etc.	reference group					
others	-0.121 *		-0.095			-0.069
	-1.810		-1.050			-0.470
(ln) cost	-0.303 ***		-0.118 ***			-0.181 ***
	-9.900		-3.020			-2.760
<b>firm specific variables</b>						
size						
sole entrepreneur		-0.123	-0.168			-0.111
		-1.140	-1.530			-0.570
1 further employee		-0.100	-0.135			0.131
		-1.020	-1.350			0.770
2 -5 employees		-0.178 **	-0.207 **			-0.111
		-2.230	-2.550			-0.870
6 - 10 employees		reference group				
11 - 50 employees		0.040	0.048			0.110
		0.460	0.560			0.820
more than 10 employees		-0.170	-0.138			0.082
		-1.320	-1.070			0.400
age_firm						
less then 2 years		reference group				
2 - 5 years		0.170 **	0.178 **			0.226
		1.970	2.030			1.390
6 - 10 years		0.349 ***	0.362 ***			0.446 ***
		4.190	4.310			3.050
more then 10 years		0.567 ***	0.546 ***			0.554 ***
		6.610	6.300			3.710
legal		0.140 *	0.104			-0.034
		1.750	1.290			-0.290
industry	n.sign.		n.sign.			n.sign.
commercial		-0.001	0.031			-0.033
		-0.020	0.390			-0.280
Nb_manager		0.076 **	0.079 ***			0.100 ***
		3.270	3.340			2.690

<b>demographic variables</b>						
education						
without education				-0.329	-0.322	-0.136
				-1.500	-1.480	-0.450
completed apprenticeship				-0.331 ***	-0.324 ***	-0.147
				-3.740	-3.650	-1.260
master, craftsman				-0.005	-0.005	0.098
				-0.050	-0.050	0.730
business management				reference group		
professional or other degree				0.052	0.052	0.031
				0.570	0.570	0.250
marital status				0.020	0.025	0.070
				0.230	0.280	0.620
gender				0.015	0.007	0.164
				0.150	0.070	1.300
region				-0.100	-0.106	0.105
				-1.110	-1.180	0.760
(ln) age_manager				0.618 ***	0.599 ***	0.382 *
				3.990	3.830	1.730
<b>risk variables</b>						
Nb_banks					0.060	0.105
					0.860	1.150
cut 1	-2.198	-0.556	-0.978	1.115	1.060	0.497
cut 2	-1.158			1.671	1.617	NA
N	3518	2181	2181	1353	1353	906
Pseudo R2	0.029	0.046	0.059	0.019	0.019	0.086

Source: Own calculation.

Notes: \* denotes test statistic significance at the 10% level, \*\* significance at the 5% level. \*\*\* significance at the 1% level

n.sign.: tested but not significant

Dependent variable: O-Probit *qual\_index*

**Table 4. Tobit regression for the use of leasing (defined as ratio of leasing liabilities to total assets)**

	I	II	III	IV	V	VI
constant	-0.013 -0.09	0.886 *** 8.3	0.072 0.39	2.800 *** 5.21	1.716 *** 2.94	0.289 0.45
<b>contract specific variables</b>						
(ln) duration	-0.042 -0.48		-0.016 -0.19			-0.040 -0.31
contract_type	n.sign.		n.sign.			n.sign.
leasing_object						
machines etc.	-0.340 *** -4.51		-0.230 *** -3.03			-0.065 -0.59
automobiles	0.098 1.62		0.115 * 1.91			0.265 *** 3.08
trucks etc.	reference group					
others	-0.195 ** -2.97		-0.118 * -1.74			-0.043 -0.43
(ln) cost	0.240 *** 8.2		0.239 *** 8.39			0.215 *** 5.14
<b>firm specific variables</b>						
size						
sole entrepreneur		0.682 *** 7.31	0.693 *** 7.94			0.836 *** 6.09
1 further employee		0.612 *** 7.84	0.669 *** 9.17			0.649 *** 6.33
2 - 5 employees		0.230 *** 3.7	0.264 *** 4.57			0.267 *** 3.21
6 - 10 employees		reference group				
11 - 50 employees		-0.239 *** -3.84	-0.179 *** -3.09			-0.135 * -1.71
more than 50 employees		-0.324 *** -3.36	-0.239 *** -2.66			0.007 0.06
age_firm						
less the 2 years		reference group				
2 - 5 years		0.261 *** -3.48	-0.308 *** -4.42			-0.182 -1.56
6 - 10 years		-0.411 *** -5.85	-0.445 *** -6.81			-0.258 ** -2.57
more than 10 years		-0.472 *** -6.71	-0.510 *** -7.73			-0.310 *** -2.95
legal		0.069 1.14	0.021 0.37			-0.029 -0.39
industry		n.sign.	n.sign.			n.sign.
commercial		0.002 0.03	0.0002 0			0.017 0.21
nb_manager		-0.011	-0.010			0.033

	-0.59	-0.61			1.36	
<b>demographic variables</b>						
education						
without education			0.831 ***	0.802 ***	0.723 ***	
			3.34	3.28	3.15	
completed apprenticeship			0.101	0.032	-0.052	
			1.21	0.38	-0.65	
master craftsman			-0.297 ***	-0.307 ***	-0.089	
			-3.61	-3.77	-1.1	
business degree			reference group			
professional or other degree			-0.024	-0.025	-0.083	
			-0.3	-0.31	-1.02	
marital_status			-0.057	-0.094	-0.081	
			-0.69	-1.14	-1.02	
Gender			-0.166 *	-0.092	-0.046	
			-1.7	-0.94	-0.52	
Region			0.266 ***	0.289 ***	0.190	
			3.23	3.57	2.11	
(ln) age_manager			-0.547 ***	-0.391 ***	-0.217	
			-3.85	-2.71	-1.48	
<b>risk variables</b>						
rating						
				0.227 ***	0.144 **	
				3.56	2.02	
nb_banks						
				-0.216 ***	-0.087	
				-3.59	-1.47	
N	1604	1234	1234	660	646	502
Pseudo R2	0.052	0.108	0.165	0.039	0.054	0.216

Source: Own calculation.

Notes: \* denotes test statistic significance at the 10% level, \*\* significance at the 5% level. \*\*\* significance at the 1% level

n.sign.: tested but not significant

Dependent variable: Tobit *total*



**Table 5. Tobit regression for the use of leasing (defined as ratio of leasing liabilities to fixed assets)**

	I	II	III	IV	V	VI
constant	-0.022 -0.140	0.889 *** 8.310	0.043 0.230	2.785 *** 5.180	1.739 *** 2.980	0.317 0.490
<b>contract specific variables</b>						
(ln) duration	-0.030 -0.340		-0.002 -0.030			-0.057 -0.440
contract_type	n.sign.		n.sign.			n.sign.
leasing_object						
machines etc.	reference group					
automobiles	-0.344 *** -4.570		-0.229 *** -3.020			-0.056 -0.510
trucks etc.	0.099 * 1.640		0.122 ** 2.030			0.268 *** 3.130
others	-0.198 *** -3.030		-0.114 * -1.690			-0.013 -0.130
(ln) cost	0.243 *** 8.300		0.244 *** 8.590			0.224 *** 5.360
<b>firm specific variables</b>						
size						
sole entrepreneur		0.711 *** 7.630	0.723 *** 8.320			0.848 *** 6.200
1 further employee		0.620 *** 7.920	0.678 *** 9.310			0.672 *** 6.500
2 - 5 employees		0.234 *** 3.780	0.271 *** 4.700			0.273 *** 3.290
6 - 10 employees		reference group				
11 - 50 employees		-0.239 *** -3.840	-0.176 *** -3.050			-0.141 * -1.780
more than 50 employees		-0.335 *** -3.440	-0.235 ** -2.600			-0.038 -0.300
age_firm						
less the 2 years		reference group				
2 - 5 years		-0.260 *** -3.450	-0.309 *** -4.430			-0.183 -1.570
6 - 10 years		-0.410 *** -5.820	-0.443 *** -6.780			-0.268 *** -2.660
more than 10 years		-0.462 *** -6.540	-0.503 *** -7.630			-0.310 *** -2.930
legal		0.074 1.230	0.027 0.480			-0.008 -0.110
industry		n.sign.	n.sign.			n.sign.
commercial		-0.006 -0.100	-0.004 -0.070			0.015 0.190

Nb_manager	-0.011	-0.010	0.036
	-0.600	-0.620	1.510
<b>demographic variables</b>			
education			
without education	0.819 ***	0.790	0.711 ***
	3.290	3.230	3.120
completed apprenticeship	0.097	0.029 ***	-0.061
	1.170	0.350	-0.770
master craftsman	-0.306 ***	-0.315	-0.094
	-3.710	-3.870	-1.170
business management expert with degree	reference group		
professional or other degree	-0.040	-0.039 ***	-0.104
	-0.500	-0.480	-1.290
marital status	-0.050	-0.086	-0.068
	-0.600	-1.050	-0.860
gender	-0.156	-0.084	-0.037
	-1.600	-0.860	-0.420
region	0.268 ***	0.287 ***	0.180 **
	3.240	3.520	1.990
(ln) age_manager	-0.545 ***	-0.393 ***	-0.220
	-3.830	-2.720	-1.510
<b>risk variables</b>			
rating		0.219 ***	0.123 *
		3.430	1.720
nb_banks		-0.213 ***	-0.079
		-3.520	-1.320
N	1597	1227	1227
Pseudo R2	0.0532	0.1097	0.169
		656	642
			498
		0.039	0.0536
			0.219

Source: Own calculation.

Notes: \* denotes test statistic significance at the 10% level, \*\* significance at the 5% level. \*\*\* significance at the 1% level

n.sign.: tested but not significant

Dependent variable: Tobit *fixed*

## **V. Conclusion**

This paper analyses a high quality dataset on commercial leasing requests in Germany, focusing on small firms and analysing for the first time the influence of demographic characteristics of the entrepreneur on the probability and use of leasing. It is the first leasing study based on firm-internal data of a leasing company. To the best of our knowledge, it presents the first multivariate analysis on the use of leasing by firms in Germany.

We find good agreement with hypotheses about the influence of characteristics of the financial contract, the firm and the entrepreneur on leasing, derived from theoretical considerations. Small and young firms that are likely to be credit rationed by banks are also likely to be rationed by leasing companies. However, they use leasing to increase their debt capacity. Beyond contract-specific and firm-specific characteristics, demographic and socio-economic characteristics of the entrepreneur are influential. A higher education and age of the entrepreneur positively affect the rating and probability to lease. Thus, higher qualified and older entrepreneurs face less financial constraints due to their skills and experience. However, higher educated entrepreneurs finance themselves less through leasing than entrepreneurs without education. Gender and marital status influence the use of leasing only by young firms, which are most likely to be constrained on loan markets. Female and non-married entrepreneurs of such firms seem to use leasing to increase their debt capacity. These results are highly relevant for aging populations where the financing of entrepreneurial activities by highly qualified, older and female persons are important to sustain growth. Therefore, further research on the influence of personal characteristics on the availability and use of leasing is necessary.

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