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## Credit and Private Equity Financing in Young Innovative Small and Medium-sized Companies in Germany

Dorothea Schäfer, Axel Werwatz and Volker Zimmermann

Successful newly established companies are a significant factor for the prosperous development of a national economy. Young innovative companies play a key role in the quick market launch and distribution of new technologies and products. As founders only rarely have sufficient own funds, financing has a considerable influence on the success of a newly established company. In the course of the investment boom in the USA and the breath-taking speed at which American Venture Capital (VC) companies listed their newly established portfolio companies in the stock market, the general attitude seems to be that a strong VC sector makes a significant contribution to the establishment of new companies and to innovation. However, it remains to be seen what role banks play in financing young technology companies. The analysis conducted by DIW together with the KfW bank group concerning the financing pattern of credit institutions and private equity companies in the sector of young technology companies is an initial contribution towards closing the gap in regard to the German market.<sup>1</sup>

The result of the analysis<sup>2</sup> is that private equity is very likely to flow into investments bearing a higher financial risk. However, such clear statements cannot be made in connection with the economic performance risk – possibly expressed in terms of innovation contents and objectives of the project. Many indicators for the economic performance risk – this includes the company's R&D-orientation as well as various characteristics of the executed innovation projects – proved to be insignificant or do not show the expected trend. Only the variable 'regular research and development' increases the likelihood of receiving private equity financing. The next step in the course of the research cooperation between DIW Berlin and the KfW bank group

<sup>1</sup> Cf. <http://www.diw.de/deutsch/dasinstitut/forschgruppen/finanzmarkt/index.html#projekte>. The present analysis is part of a larger research project on the role of the banks and venture capital companies in financing the establishment of new companies. The project SCHA841/1-1 is supported by the German Science Foundation

<sup>2</sup> Cf. Dorothea Schäfer, Axel Werwatz and Volker Zimmermann: 'The Determinants of Debt and (Private-)Equity Financing: The Case of Young Innovative SMEs from Germany'. In: *Industry and Innovation*, vol. 11, no. 3, 2004, page 225-248.

## Overview

### Explanatory Variable – Risk Indicators and Expected Impact on the Probability of Equity Financing

Financial risk	
Equity ratio	
Equity / balance sheet total	–
Ratio between tangible and intangible assets	
Fixed assets / labor costs	–
Financial exposure	
Investment sum / balance sheet total	+
Gross earnings	
Turnover – labor costs – costs of material	–
Economic performance risk	
Age	–
Very new	
R&D-project instead of market launch	+
New product development instead of further product development	+
Market launch of a newly developed product instead of market launch of a further developed product	+
Highly ambitious project	
New business / technology field	+
Strong R&D orientation	
R&D regularly	+

+ Expected impact positive: probability of equity financing goes up.  
 – Expected impact negative: probability of equity financing decreases.  
 Source: DIW Berlin compilation.

will be the quest for the causes of these unexpected findings.

While innovative young companies have a great potential for success, they also bear a high risk of failure. Therefore, the financing party's increased willingness to take risks is an essential prerequisite for the financing of both companies and projects. Smart money, i.e. expertise in selecting the projects, qualified consultation and assistance in developing the company as well as the financing party's ability of tight control, increases the prospects of success and consequently the expected project value. Smart money is unimaginable without a close relationship to the company, regular contact and access to confidential company records. One of the prerequisites for its provisions is the financial intermediary's incentive to control the company and the availability of the corresponding instruments for the protection of its interests through opportunities to influence the decision-making authority. Both the relevant willing-

ness to take risks and the ability to provide smart money are attributed almost exclusively to the VC sector and thus to private equity financing. Banks supposedly lack both.

However, this point of view is likely to particularly reflect the conditions in the market-centered US-American financial system. Due to regulations, US-banks have only few incentives and instruments to influence companies directly. In the 90s they withdrew heavily from corporate financing. In the German universal banking system, the situation is quite different of course. Here, banks provide four fifths of the entire corporate financing. Based on typically low equity ratios, especially among German medium-sized companies, banks bear high risks. German banks are subject to relatively few regulative restrictions concerning their contract behavior. Empirical evidence is available for established companies, showing that house banks use their status to influence the management.

In the course of financing procedures for established companies, German Banks show both a considerable willingness to take risks and the basic ability to provide smart money. The present analysis investigates the question of whether this applies to the very risky but also very promising sector of young innovative companies. It particularly verifies whether banks only finance the relatively safe investments while private equity companies commit to high-risk-projects, i.e. whether the risk leads to a divided market in regard to financing young companies.

## Theoretical explanatory patterns controversial

The new financing theory offers controversial answers to the question of whether the market is segmented due to risks concerning the financing of young high-tech SMEs.<sup>3</sup> On the one hand, there is the opinion that companies with projects bearing high risks but also very high earnings expectations are the ones striving to receive credit financing. After all, in case of success they must share the high surplus with the financing party in case of participation, while with credit financing they can keep them, provided the surplus exceeds the bank's fixed repayment claim.

On the other hand, there is the argument that projects with both high intrinsic economic performance risk and high financial risk are generally private equity financed. Projects that are safer in regard to either risk dimension are more likely to receive credit financing. On

<sup>3</sup> SME = small and medium-sized enterprise.

the one hand, the reason stated is that young high-tech companies do not have access to credit financing for highly risky investments, especially because they usually do not have the required securities. On the other hand it is assumed that a private equity company – unlike banks – is able to provide smart money and if necessary to take over the company itself. As such expertise is very valuable for these companies, preferably private equity VC-financing or financing similar to private equity VC-financing is granted. This hypothesis also corresponds with the common attitude towards financing patterns in the sector of young high-tech companies.

Within the study about financing patterns of credit institutions and private equity companies in the high-tech sector presented here, both theory and common attitude are being put to test. For this, the ability of the indicators for both the economic performance risk and the financial risk of individual projects or companies to explain the allocation of the young innovative companies to the two financing alternatives – private equity financing or credit financing – is being verified. There is an a priori expectation that the likelihood for private equity financing increases concurrently with both the growing economic performance and the financial risks.

## Private equity financing versus credit financing in Germany

For decades, banks have been the backbone of SME-financing in Germany.<sup>4</sup> In comparison thereto, the private-equity-sector is still struggling to gain maturity. The first private equity company was established as late as 1965. Until the beginning of the 90s, there were only a handful of VC companies. The now relatively high figure of over 180 companies is in large part based on the 'establishment boom' after 1997. On average, private equity companies in Germany are younger and less experienced in comparison to the USA but also to many European countries. Experience with the entire cycle, i.e. investment fund-raising, investing in portfolio companies and exit cannot be found very often among German private equity companies.<sup>5</sup>

The exact proportion of private equity financing in financing of innovative SMEs is not known. For all SMEs together, credit financing is by far the most

important financing source. Estimates for USA only mention a private equity portion of only 5% in the entire SME-financing.<sup>6</sup> For Europe and Germany in particular, this portion should be smaller by far; the level of development of the private equity sector and the specific business model of domestic banks strongly suggest this conclusion. Credit financing, based on the house bank principle, still constitutes the core business for most German banks. Hackethal and Schmidt estimate that between 1970 and 1996, over 80% of gross financing for German companies came from the banking sector; in the USA the figure for the same period was merely 44%.<sup>7</sup>

## Sample

The data employed contain information on financial risk characteristics of young high-tech companies, the economic performance risks of innovation projects and the type of financing (private equity or credit financing). The data come from KfW-programs for the promotion of innovation. It is an important feature of these programmes that the German promotional bank did not invest in innovation projects of high-tech companies itself, but instead supported private credit and private equity investors' exposures with favorable refinancing offers. The period under review ranges from 1999 to 2003. Private equity financing includes all types of investments held. The oldest of the companies under review had been established five years ago.<sup>8</sup> Projects were only taken into consideration if a balance sheet of the firm that exercises the project was available.

## Risk indicators

The investors' (private equity company or credit institution) risk is represented based on various indicators. The age of the company is deemed to be a general risk indicator. The younger the company, the higher the risk associated with investment.

The financial risk is measured through four indicators: the relative size of the financial exposure (investment sum vs. balance sheet total), the ability of 'collateralizing' (tangible assets in the form of fixed assets to

<sup>4</sup> Cf. Jörg Fischer and Volker Zimmermann: 'Private Equity in Germany', KfW special publication. Frankfurt a.M. 2003.

<sup>5</sup> Cf. Andreas Bascha and Uwe Walz: 'Financing Practices in the German Venture Capital Industry. An Empirical Assessment'. *CFS working paper* 2002/08. Frankfurt a. M. 2002.

<sup>6</sup> Cf. Allen N. Berger und Gregory F. Udell: 'Small Business Credit Availability and Relationship Lending: The Importance of Bank Organizational Structure'. In: *The Economic Journal*, 112/2002, F32-F64.

<sup>7</sup> Cf. Andreas Hackethal und Reinhard H. Schmidt: 'Financing Patterns: Measurement Concepts and Empirical Results'. *Working Paper, Series: Finance & Accounting*, no. 33. Johann Wolfgang Goethe-University Frankfurt a.M. 2000.

<sup>8</sup> The turnover upper limit is euro 125 million.

intangible assets in the form of labor costs), the equity ratio (equity to balance sheet total) as proxy for the risk of insolvency as well as the company's gross earnings (annual turnover minus labor and materials' costs<sup>9</sup>) as proxy for the ability of covering the costs of debt. Should the hypothesis according to which projects with high financial risks will be more likely to be financed by a private equity company than by a credit institution be correct, all signs of the financial risk indicators should be negative, with the exception of the financial exposure indicator (see overview).

Various characteristics of the innovation project, concerning the associated objectives of the company and the R&D orientation of the project and the company which the project belongs to are deemed to be indicators for the economic performance risk. In regard to the innovation content of the project, the following assumptions are made:

- The economic performance risk is higher,
1. if the means are employed for the development of a new product or process instead of the market launch;
  2. if a product is newly developed and not further developed;
  3. if the investment is made in the market launch of a totally new product instead of a further developed product.<sup>10</sup>

Regarding the objectives of the innovation project, the risk is assumed to be higher if a new business or technological field is to be developed with the investment.

The risk associated with a strong R&D orientation is expressed by the regularity with which a company pursues R&D (R&D regularly). According to the hypothesis, positive signs are expected a priori for all indicators of the economic performance risk (except age).

## Verification method

In order to verify the connection between the financing form and the risk characteristics of young high-tech companies (or their innovation projects respectively), several multivariate regression models<sup>11</sup> are designed. Every specification contains the age of the companies and all financial risk indicators as explanatory variables. The economic performance risk indicators are gradually added to this basic specification. The sector

<sup>9</sup> In innovative companies, the intangible assets are mainly made up of knowledge stored in the heads of employees. These intangible assets are not accepted as security, while fixed assets are accepted as such.

<sup>10</sup> The indicators are qualitative variables. In the estimate, the indicator 'New development instead of market launch' received the value 1, in case it is a new development and the value 0, in case it is a market launch. The other indicators are treated analogously.

and the year of application are the control variables. The estimated coefficients indicate the change of the likelihood of a private equity financing in comparison to a credit financing if the value of the relevant indicator increases.

## Results

The results are reflected in Table 2. The sign of the coefficient for the financial risk corresponds to the expectations. If the financial risk increases, the likelihood for a private equity financing increases as well. In contrast, credit financing becomes more likely in case of a company's growing equity ratio as well as growing cash-flow – approximated by gross earnings. In addition, banks are more likely to commit to projects that are smaller in relation to the company size.

The indicators for the economic performance risk are partially insignificant or point in the opposite direction. The likelihood of a private equity financing (in relation to a credit financing) decreases if various economic performance risk indicators included in the review go up. This is true for the newness of the innovation or the distinction between R&D phase and market launch phase. However, this direction of action cannot be determined for the regularity with which a company pursues R&D. For a company that regularly pursues R&D, the likelihood of private equity financing is higher than for a company that pursues R&D only at irregular intervals.

These results for the economic performance risks are relatively robust in terms of quality. They remain the same for the most part if the estimated models are 'smaller', i.e. if fewer financial variables are simultaneously included in the model.

## Conclusion

Frequently, the private equity sector is regarded as an instrument for the solution of financing problems of young high-tech companies with high-risk investments. However, it is not very well known whether this common opinion actually corresponds with reality in a bank-centered financial system. According to it, the riskier young high-tech-SMEs would actually be more likely to receive private equity financing than credit financing.

<sup>11</sup> Both linear and non-linear variants of the multi-variate logit-model are being assessed. While the non-linear variants of the model show significantly better adjustments to the data in several cases, the results from the linear model variant that are easier to interpret are stated here. The results are mostly identical in terms of quality (i.e. regarding direction and intensity of the determined correlations).

Table

## Estimates of Linear Logit-models

	Basis	Model 1	Model 2	Model 3	Model 4	Model 5
Random sample	228	135	128	128	98	131
Equity capital vs. balance sheet total	-2.04	-2.20	-1.86	-1.98	-2.32	-2.75
Fixed assets vs. labor costs	0.00	-0.03	0.00	0.01	0.03	-0.05
Investment sum vs. balance sheet total	0.28	0.50	0.53	0.51	0.90	0.55
Turnover – labor costs – cost of material	-2.32	-3.63	-3.73	-3.80	-4.54	-3.85
Age	0.21	-0.01	-0.02	-0.01	-0.06	-0.11
R&D project instead of market launch		-1.60767				
New product development instead of further product development			-1.01			
Market launch of a newly developed product instead of a further developed product				-0.33		
New business / technology field					-0.36	
R&D regularly						2.16

Significance: 10%-level 5%-level 1%-level

Source: DIW Berlin calculations.

The results for the financial risk generally meet expectations: Banks concentrate on companies and projects with low financial risks.

The results for the economic performance risk indicators are less distinct. In this case, the risk factors taken into consideration have no clear trend towards private equity or credit financing. Under the assumption that with an increasing degree of R&D dependency in a company, the risk of failure increases as well, VC companies are obviously willing – concerning this central characteristic<sup>12</sup> for the current and future innovation power of a company – to take higher risks.

However, the qualitative risk indicators concerning the characteristics of an innovation project and the associated objectives of the company are either insignificant or point in the opposite direction. This leads to the conclusion that German banks – traditionally a dominating power in financing conventional SMEs – contrary to

accepted opinion, do commit to riskier early stages of product and process developments in SMEs as well. However, they limit their risk by financing only relatively small projects of companies with low financial risk. Obviously, banks focus particularly on financial indicators. If those show a relatively low risk of failure, project-related risks predominantly reflected by economic performance characteristics can be merely circumstantial.

However, the German VC sector pursues another business model: with its focus on companies with low cash-flow and high R&D activities, it specializes in a business type with high risks, attempting to restrict that risk by carefully examining the innovation projects.

All in all, in the sector of young innovative companies, the results of other studies are also confirmed, showing that banks base their decisions concerning credits above all on company characteristics with project-related factors playing a secondary role.<sup>13</sup>

<sup>12</sup> Cf. Christian Rammer: 'R&D behavior in young companies in Germany – a panel analysis for the period 1998 to 2003'. ZEW (Centre for European Economic Research), *Studies concerning the German innovation system*, no. 8-2005. Mannheim 2005.

<sup>13</sup> Cf. Volker Zimmermann and Jan Schumacher: 'Corporate financing: still difficult, but improvement is near'. KfW special publication, Frankfurt a.M. 2005.