

# THE GENESIS OF VENTURE CAPITAL – LESSONS FROM THE GERMAN EXPERIENCE

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# THE GENESIS OF VENTURE CAPITAL – LESSONS FROM THE GERMAN EXPERIENCE

## Abstract

Why does venture capital work in some countries but not in others? This clinical study of the first German venture capital firm examines the difficulties of creating a venture capital market in a bank-based financial system. The analysis identifies the problem of creating appropriate governance structures to protect investor returns. It exposes the difficulties of established banks - not to mention government - to devise venture investment strategies. It identifies the availability of high quality entrepreneurs as a critical complement. And it provides a reinterpretation of the hypothesis of Black and Gilson (1997), arguing that the existence of an active stock market is a necessary, but by no means sufficient condition for the development of venture capital.

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# 1 Introduction

How does venture capital take root in an economy? While it is firmly established and sophisticated in the US, many countries face an institutional environment that is quite different. Banks often play a more dominant role, and the prominence of entrepreneurship differs significantly across countries. At present, little is known about what conditions are necessary to create a venture capital market, how existing financial institutions - such as banks - can affect its development, and what role government might have in the process.

In this paper, we study the original attempt to promote venture capital in Germany. Germany is interesting because it is a leading industrial nation and because it has a set of institutions that is distinctly different from the US. Most importantly, there was an explicit attempt to create a venture capital industry: the founding of the Deutsche Wagnisfinanzierungsgesellschaft, the first German venture capital fund (for apparent reasons, we will refer to it by its abbreviation, “WFG”<sup>1</sup>). The experiment was a complete failure. The WFG had significant financial losses, resulting in a rate of return below -25%, and never succeeded in inducing larger market development. The history of the WFG provides a rare opportunity to study how venture capital may (fail to) develop in an environment that is not naturally preordained for it.

Our analysis uncovers multiple layers of reasons for why it was so difficult to create venture capital in Germany. On a first level, we can trace the failure of the WFG back to inappropriate contracting and governance structures. The contracts that the WFG offered to entrepreneurs contained too little protection for investors, and the governance structure prevented venture capitalists from adding value to or exercising control over their portfolio companies. Why then did the WFG ever engage in such unfavorable transactions?

On a second level, we uncover more profound forces that led the WFG to offer contracts that did not maximize shareholder wealth. Indeed, the shareholders of the WFG (large German banks and the government) pursued interests that were different from shareholder wealth maximization. While the government was most concerned about the commercialization of new technologies, the banks worried about minimizing any risks to their reputation. This conflict of interests may help to explain the use of seemingly inappropriate contractual and governance structures.

However, we then need to ask whether a differently structured venture capital fund could have solved the problems of the WFG, or whether they were endemic. Subsequent entrants into the German venture capital market, both German and from the Anglo-Saxon world, encountered similar problems as the WFG. This suggests deeper problems for the development of a viable venture capital industry, problems rooted in the German institutional structure. We identify the availability of high quality entrepreneurs and the incentives for entrepreneurship as critical determinants. Our analysis sheds some new light on the hypothesis of Black and Gilson (1997) about

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<sup>1</sup>The name roughly translates into German Venture Financing Corporation.

the importance of an active stock market for the development of venture capital. We show that while a stock market is necessary, it is by no means sufficient - further complementary changes in the economic system must precede the emergence of venture capital.

The remainder of the paper is organized as follows. Section 2 explains the theoretical foundations of our research. Section 3 describes our research methodology. Section 4 outlines the history and performance of the WFG. Section 5 examines the contractual and governance-related constraints. Section 6 looks at the underlying conflicts of interest between the managers and owners of the WFG. Section 7 shows how the problems of the WFG are a reflection of the German system and its incentives for entrepreneurship. Section 8 uses these insights to revisit the question of the role of stock markets in the development of a venture capital industry. Section 9 summarizes the results and concludes the paper.

## 2 Theoretical foundations

Ever since Jensen and Mecklin (1976), agency costs have played a central role in financial theories. The seminal papers of Diamond (1984), Fama (1985) and Stiglitz (1985) suggested that financial intermediaries - mainly banks - could play a role in the reduction of agency costs (see Bhattacharya and Thakor (1993) for a useful survey). Venture capital is a different form of financial intermediation, focusing on the provision of equity financing to private companies. The work of Admati and Pfleiderer (1994), Berglöf (1994), Gompers (1995), Hellmann (1998, 2002), Hellmann and Puri (1999, 2000), Kaplan and Strömberg (1999), Lerner (1995) and Sahlman (1990) shows how venture capitalists solve a frequently more extreme set of agency problems. Beyond the monitoring and certification role, this literature emphasizes value-added support and governance control as key roles played by venture capitalists.

Great focus has been put on the dyadic relationship between companies and their investors. To truly understand financial institutions though it is necessary to analyze how they fit into their economic system. The work of Bebchuk and Roe (1999), Gilson (1996), Gilson and Roe (1993), Roe (1998) and others shows how corporate finance and corporate governance are embedded in and largely determined by the larger institutional economic systems. The work of La Porta et al. (1997, 1999) and Demirgüç-Kunt and Maksimovic (1999) argues that different economic systems provide different levels of protection to minority shareholders, and shows how this affects the way financial intermediation is organized. And the work of Allen and Gale (2000), Aoki (2000), Aoki and Patrick (1994) or Boot and Thakor (1997), examines more specifically how financial intermediaries work differently in different economic systems. A central theme of this literature is to compare bank-based with stock-market-based systems. Because of data constraints, the empirical work in this area has focused mainly on large, publicly traded companies, leaving aside private companies that often constitute a larger segment of the economy, especially in bank-based

systems.

This paper examines how venture capital is created in an environment that is not naturally pre-ordained for it. It begins with an agency theoretic view, examining the contracts and governance relationships between the WFG and its entrepreneurs. However, to understand some of the peculiarities of these arrangements, we need to examine how they are shaped by the institutional environment. We consider the relationship between the WFG and its owners - the incumbent banks and the government. This introduces a second layer of agency problems that helps to explain the relationships between the WFG and its entrepreneurs. We also examine how a system-wide lack of incentives for entrepreneurship may undermine the development of venture capital.

We draw on the theory of complementarities (see Milgrom and Roberts, 1990, 1994, 1995), which examines equilibrium congruence among agents when the benefit of one agent's action is enhanced by the other agents' actions. In such a framework, we can endogenously understand institutions. There may be multiple equilibria, and different countries may end up in different equilibria. A key insight from this theory is that if one introduces a new institution - such as the first venture capital fund in a country - its effect and own viability can vary considerably: it depends on which equilibrium pre-exists in the economy. Milgrom and Roberts show that in an equilibrium with complementarities any single deviation is necessarily unprofitable: either some agent (possibly the government) has to be willing to incur losses for institutional change, or the initial change must be accompanied by further changes in the system so that the system can move toward a new equilibrium.

Recently, a small literature has begun to address the question of how venture capital may emerge in countries with different institutional arrangements. The most important contribution is by Black and Gilson (1997). They argue that the lack of an active stock market in a bank-based system hampers the development of a venture capital industry. Milhaupt (1997) examines how venture capital (fails to) fit into the Japanese corporate governance system. Jeng and Wells (1997) provide an empirical cross-country comparison of venture capital markets, though their analysis is limited by the lack of data comparability. Gompers and Lerner (1998) empirically examine the US venture capital market and suggest that demand-side considerations may determine the size of a venture capital market (i.e. the financing needs of entrepreneurs).

### **3 Research methodology**

The objective of this paper is to shed light on the dark side of complementarities. Theory suggests that in a complementary system the return to a single institutional innovation is negative. Is there any empirical evidence for this? Who would want to pursue such institutional innovations, and why? And how does an institution develop under such adverse circumstances?

We examine one of the rare cases where we can observe a natural experiment involving institutional change. The WFG was created with the explicit purpose of being a catalyst for institutional change, more specifically for the creation of a German venture capital market. This is important not only because of the role of venture capital for economic growth, but also for its implications on the corporate governance debate. Moreover, the natural experiment of the WFG encountered severe problems that led to fundamental rethinking and restructuring. It provides a unique perspective on how a new institution may adapt in a hostile environment.

Our research approach is inherently multi-disciplinary. Its conceptual foundation is the theory of corporate governance and financial intermediation, as well as the theory of complementarities and systemic change. At the core of the analysis is a clinical study of the history of the WFG - the history of the creation of the German venture capital market. This involves historical content analysis, extensive field research and finally some simple statistical hypothesis testing.

Why Germany and the WFG? Germany is not only one of the leading economic nations, it is also a leading example of a bank-based financial system that is different from the market-based Anglo-Saxon system. And the WFG was a conscious attempt to promote the development of a German venture capital market. Because both the government and the main incumbent financial institutions (all significant banks) participated, some light is shed on their respective motives. The many mistakes and changes that occurred in the early days of the WFG provide a rich opportunity to study elements that are central to the development of any venture capital market.

For the historic analysis, we identify a large variety of original and secondary sources that document the history of the WFG and its surrounding economic environment. We gathered all references to the WFG in the German academic literature and collected what we believe to be a fairly complete set of contemporary articles in the German business press on the WFG.<sup>2</sup> Finally, we extensively searched the German press and looked for broader sources of information, sources that we think are helpful to shed light on atmosphere and mood in Germany at the time of the WFG's incorporation, and so on factors that the founders of the WFG were keenly aware of.

For the field study, we conducted interviews in Germany with managers of the WFG, recipients of venture capital from the WFG and managers of other German private equity companies. Most of them actively participated in the industry in the 1970s and 1980s.<sup>3</sup> To obtain actual data from venture capital firms is difficult in the

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<sup>2</sup>Some of the most useful German language references include Büschgen (1985), Fanselow (1983, 1985, 1988), Kokalj and Albach (1987), Pohl (1978), Schmidt (1988), Schmidt and Willms (1987) and Stedler (1993).

<sup>3</sup>Our interviewees were Karl-Heinz Fanselow, CEO of the WFG since 1978 and CEO of all of its successor organizations; Reinhard Löffler, manager at the WFG and its successor organizations; Jochen Tschunke, former CEO of C2000; Andrew Richards, partner with 3I; Waldemar Jantz, partner with TVM; Mr. Firmenich, CEO of Commerz UBG; Dr. Martin Halusa, partner with APAX/Munich; Dr. Fromann, chairman of BVK; Rolf Dienst, CEO of Wellington Finanz and Jörg Kreisel, manager at GENES (Cologne). Since most of these interviews were conducted in

US and almost impossible in Germany. We were fortunate, however, to obtain access to a set of documents not generally available to the public. In particular, we obtained copies of all annual reports of the WFG. While the annual reports only provide yearly and sometimes aggregated data, they nonetheless offer some insight on questions that are usually not accessible for research at all.<sup>4</sup>

As with any clinical study, our evidence is meant to be persuasive on the whole and does not pretend to be conclusive in a formal sense. The main objective of the paper is to empirically identify the various economic forces that affect the development of venture capital, to gauge their relative importance in a non-US context and in the process to derive new insights that will hopefully stimulate further theoretical and empirical work.

## 4 The history and performance of the WFG

The WFG was an outright failure. It recorded a loss every year during the first nine years and small profits thereafter (see figures 1 and 2). The cumulative losses over its lifetime amounted to 38.4 million DM. Through a downside risk guarantee the government bore 37.7 million DM of these losses, leaving the banks with less than a million DM of actual losses. There were no revenues in the first three years, and the revenues from the government subsidy exceeded the revenue from investments for every year up to 1984 when the government and the WFG parted ways (see table 1). The internal rate of return for the investment of the WFG was -25.07%. This is the value for the overall portfolio, excluding the government subsidy. If we count the subsidy as revenues for the WFG, the internal rate of return was -11.41%. Note also that these are nominal rates of return ignoring inflation. The real rates of return are thus even lower.

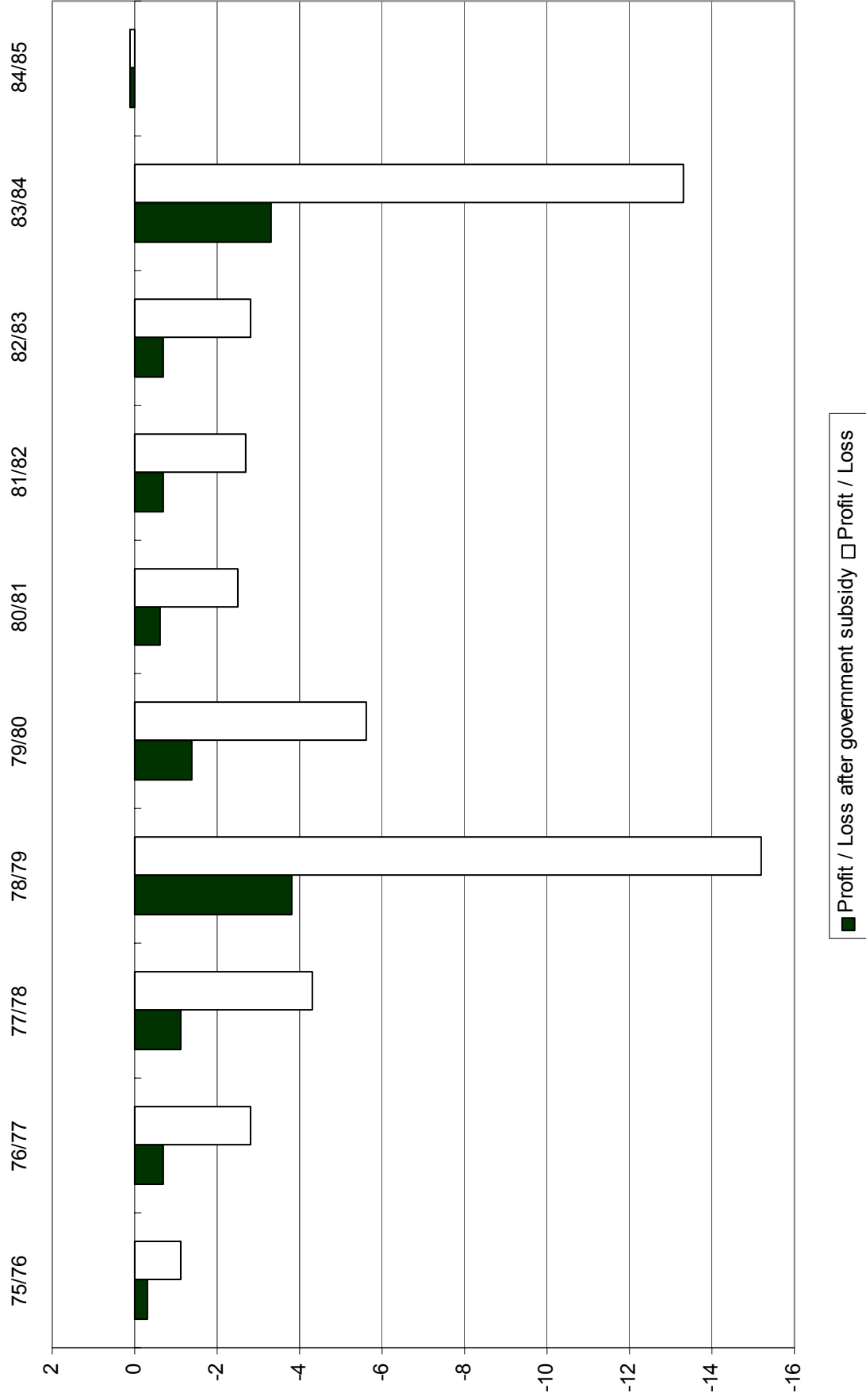
In venture capital, revenues are mainly generated at the time of exit of the investor. The main methods of exit are IPOs, acquisitions, buy-backs (where the entrepreneur repurchases the shares) or bankruptcy. Figures 3-5 show some detail on how companies exited; we notice a predominance of bankruptcies, acquisitions and buy-backs. Most of the firms in the acquisitions and buy-backs category were no profitable investments. More than two thirds of the WFG's companies resulted in partial or total losses, and less than 20% of the portfolio companies ever generated any returns. By comparison, Sahlman (1990) estimates that in a typical US venture capital portfolio about one third of all investments result in a partial or total loss, and two thirds of

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German, we use content-based translations for most quotes. We suppress the identity of individual interviewees, except for those instances where the identity is material to the understanding of the quote.

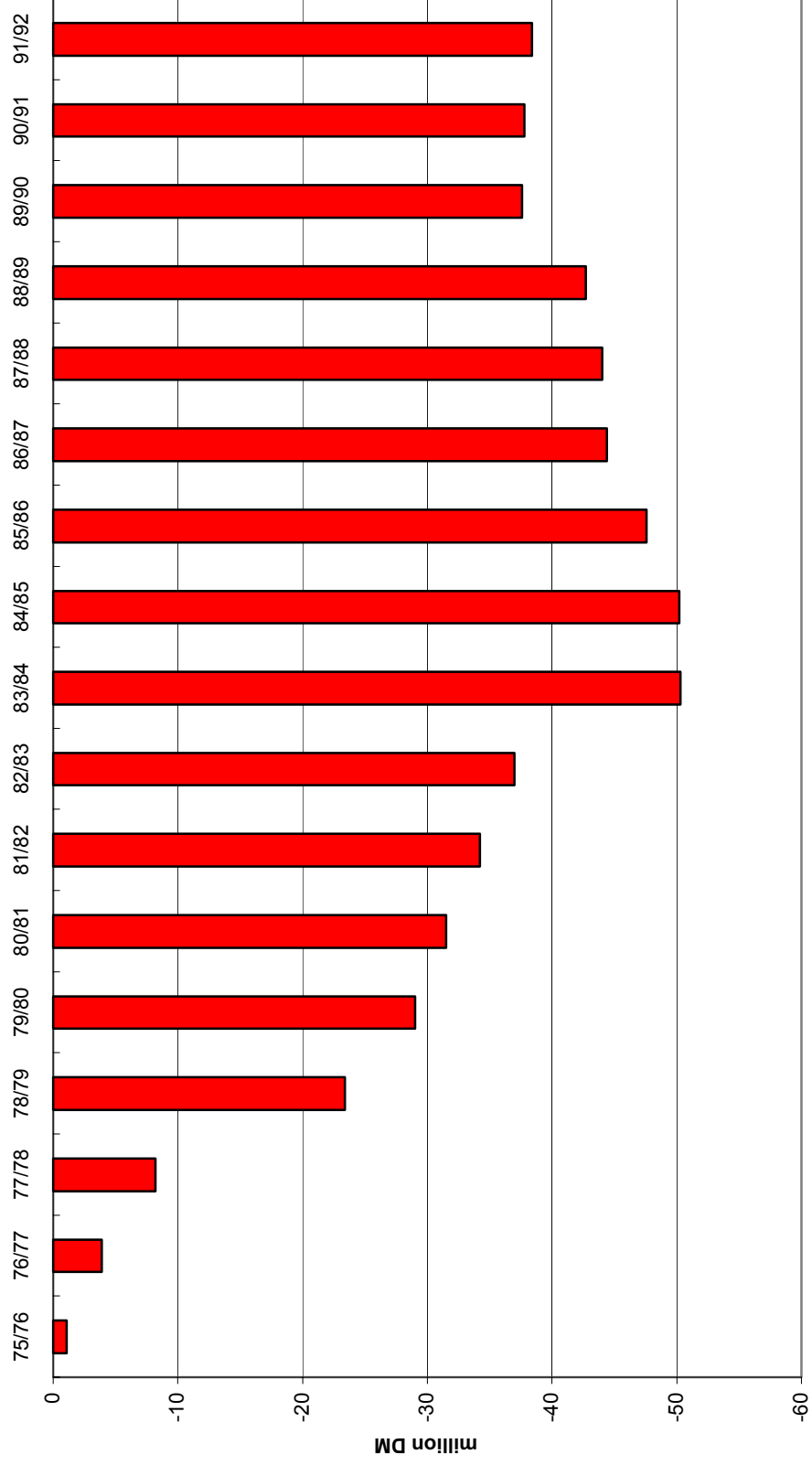
<sup>4</sup>Unfortunately, it was impossible to secure deal-specific data. Note, however, that this kind of data is also not generally available in the US, where access to data for researchers tends to be easier than in Germany.

Figure 1: Profit / Loss performance of the WFG





**Figure 2: Cumulative net profits of the WFG**



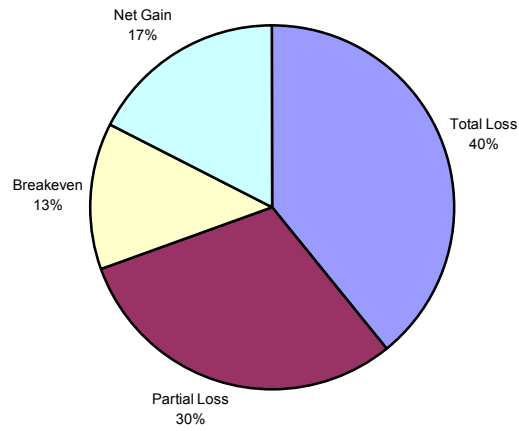
**Table 1:**

**Excerpts from the Annual Reports of the WFG**

Year	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Revenue from Investments	0	0	0	0.1	0.2	0.7	1	1.9	2.2	3.7	4	3.2	2.5	0.7	0.5	0.2
Revenue from Government Subsidy	0.8	2.1	3.2	11.4	4.2	1.9	2	2.1	10	0	0	0	0	0	0	0
Total Number of Companies in Portfolio	3	11	19	22	14	11	19	27	34	28	25	23	14	8	4	3
Amount of New Investments	1.2	4.7	5.8	12.2	4.7	2.8	7.6	10.4	18.8	1.6	0	0	0	0	0	0
Bankruptcies	0	0	1	2	3	1	0	0	4	3	1	1	3	0	2	0
Acquisitions & Buy-Backs	0	0	0	0	8	4	0	1	0	3	2	1	6	6	2	1
IPOs	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0

The revenues are in Million Deutsch Marks. All other values are counting variables.  
 The fiscal year of the WFG began in September. The given year indicates the end of a fiscal year.  
 The contract with the government that generated revenue from subsidies ended in 1984.

**Figure 3a: WFG returns**



**Figure 3b: US venture capital returns**

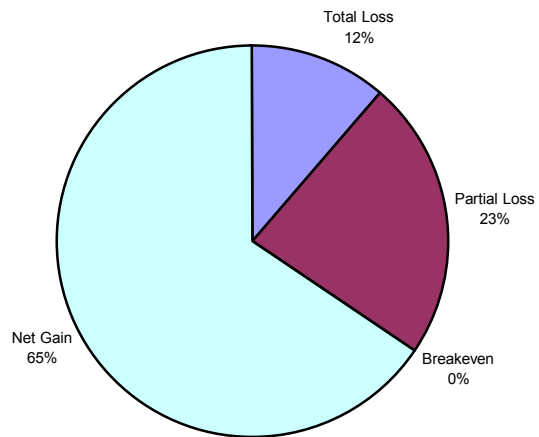


Figure 4: Exits by type of exit

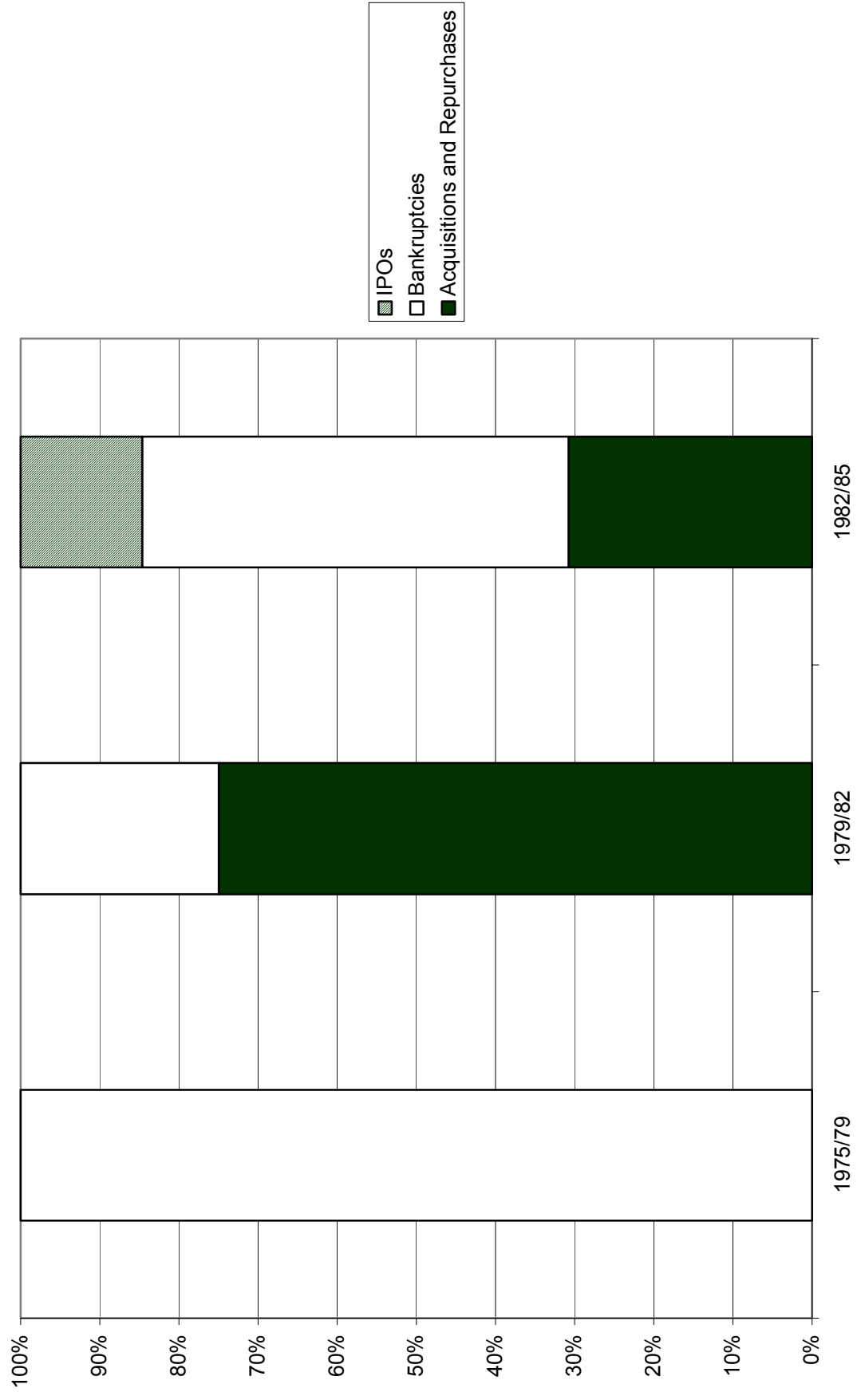
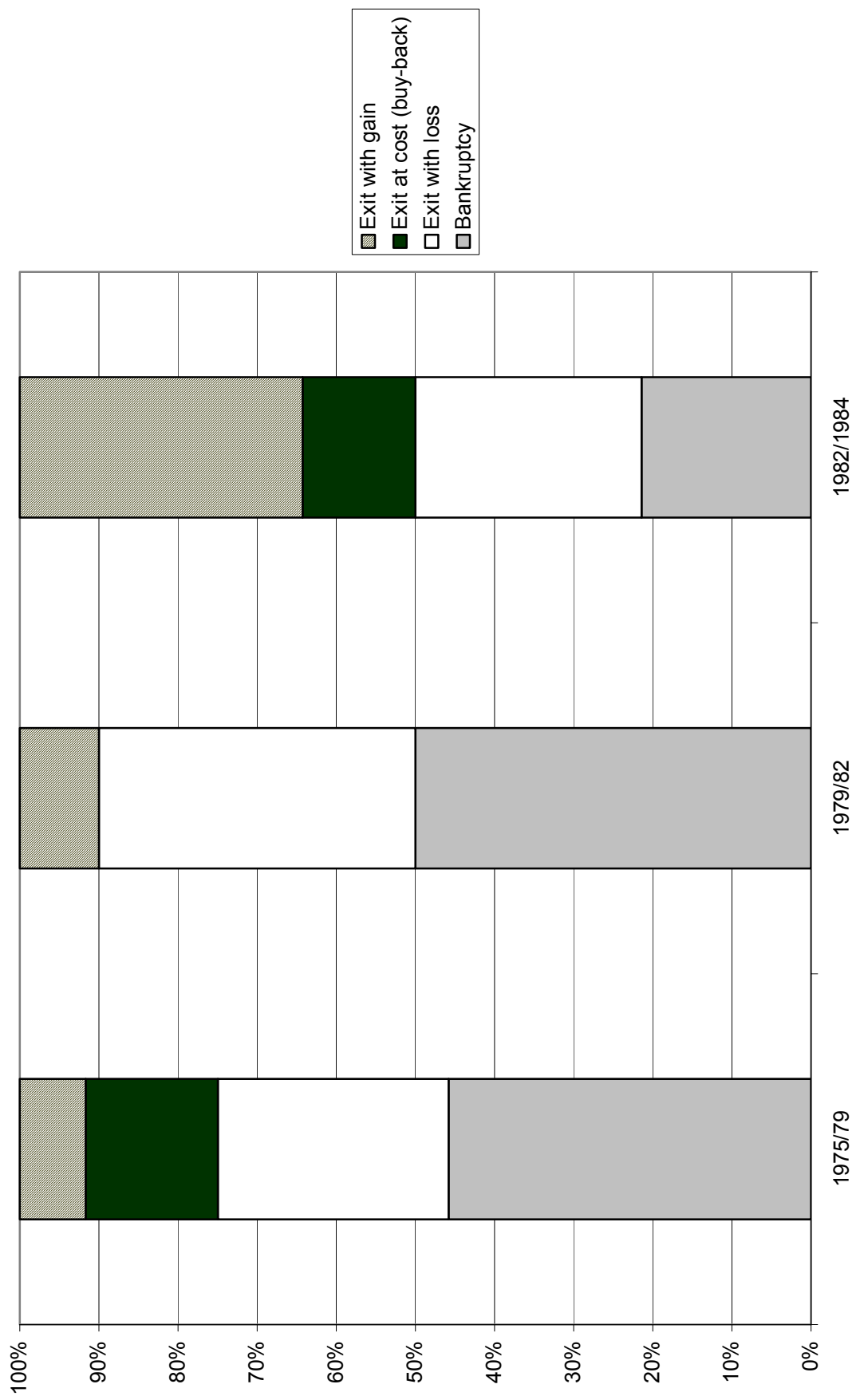


Figure 5: Outcomes of investments



the companies generate positive returns.<sup>5</sup>

The WFG was initially endowed with 10 million DM of capital, which was subsequently raised to 30 million DM and then to 50 million DM. This modest capital base was provided by an impressive list of 29 banks, including all big German retail banks and the head organizations of the savings and loan institutions (see table 2). To induce all these banks to contribute even such a small amount of money, the government provided a generous downside guarantee, insuring up to 75% of the losses that the WFG might incur. The intended time-horizon was 15 years. The board of directors was comprised of two industry representatives, three bank representatives, two management consultants, two scientists, and three government administrators, one each of the ministries of commerce, finance, and research & development.

We should point out that during the same period the US venture capital market had its first significant growth period. Gompers and Lerner (1998) report that the size of the US venture capital pool increased from \$427 million in 1978 to \$5,453 million in 1983, and the number of venture capital-backed IPOs from 6 in 1978 to 121 in 1983.<sup>6</sup> The misfortune of the WFG can thus not be blamed on an overall slump of venture capital activity.

The abysmal performance of the WFG did not go unnoticed. Over the first three years, four new CEOs were hired in the hope of addressing the instantly visible shortcomings, and of turning around the WFG. In November 1978, Karl-Heinz Fanselow (the latest new co-CEO) realized that, as he says, the WFG was essentially bankrupt. The board of directors put him alone at the helm of the WFG soon thereafter, a position he retained until the demise of the WFG. Under his leadership the WFG underwent a fundamental transformation. In 1984, the WFG ended its relationship with the government and decided not to make any further investments. At this time, five of the largest banks created a new venture capital fund, called WFGneu (new WFG), which would continue to invest, and also oversaw the liquidation of the existing portfolio of the old WFG.

The WFG failed to create a German venture capital industry. How could this well-intended experiment go so wrong? Why could even the most prominent German financial institutions not make this small venture capital fund work? And why was it impossible to develop a venture capital business in one of the world's most advanced economies?

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<sup>5</sup>The numbers of the WFG and Sahlman are not directly comparable: Sahlman measures investments by the amount invested, the WFG based on the number of projects. Since the WFG invested relatively similar amounts in all of its companies, and made almost no follow-up investments, the measurement difference is not as important as it may seem at first.

<sup>6</sup>1983 was the peak of this first venture capital boom, followed by a period of substantial variability.

**Table 2: Alphabetical List of Investors of the WFG**

1. Badische Bank AG (Mannheim)
2. Bank für Gemeinwirtschaft AG (Frankfurt)
3. Bayerische Hypotheken- und Wechselbank AG (München)
4. Bayerische Landesbank, Girozentrale (München)
5. Bayerische Vereinsbank AG (München)
6. Berliner Handels- und Frankfurter Bank KGaA (Frankfurt)
7. Commerzbank AG (Düsseldorf)
8. Delbrück & Co (Frankfurt)
9. Deutsche Bank AG (Frankfurt)
10. Deutsche Genossenschaftsbank (Frankfurt)
11. Deutsche Girozentrale - Deutsche Kommunalbank (Frankfurt)
12. Dresdner Bank AG (Frankfurt)
13. Effectenbank-Warburg AG (Frankfurt)
14. Hamburgische Landesbank, Girozentrale (Hamburg)
15. Hessische Landesbank, Girozentrale (Frankfurt)
16. Industriekreditbank AG, Deutsche Industriebank (Düsseldorf)
17. Landesbank Rheinland-Pfalz, Girozentrale (Mainz)
18. Landesbank Saar, Girozentrale (Saarbrücken) (from 1976/77 onwards)
19. Landesbank Schleswig-Holstein, Girozentrale (Kiel)
20. Landeskreditbank Baden-Württemberg (Karlsruhe)
21. Merck, Finck & Co. (München)
22. Norddeutsche Landesbank, Girozentrale (Hannover)
23. Sal. Oppenheim jr. & Cie (Köln)
24. Sparkasse der Stadt Berlin West (Berlin) (from 1976/77 onwards)
25. Trinkhaus & Burkhardt (Düsseldorf)
26. M. M. Warburg-Brinckmann, Wirtz & Co (Hamburg)
27. Westdeutsche Landesbank, Girozentrale (Düsseldorf)
28. Westfalenbank AG (Bochum)
29. Württembergische Bank AG (Stuttgart) (merged in 1977 with Badische Bank AG)

## 5 The relationship between venture capitalists and entrepreneurs

**Conjecture 1** *The failure of the WFG was related to the use of inappropriate contractual instruments and governance relationships between the venture capitalists and the entrepreneurs.*

At the heart of venture capital is the process of selecting promising entrepreneurial companies, helping them to develop their potential, and participating in the rents generated by successful companies (Bygrave and Timmons (1992); Gompers and Lerner (1999)). The WFG could not successfully get this process going.

An important aspect of US venture capital is the hands-on support provided by venture capitalists. The WFG soon realized the need for such hands-on support. All of its first portfolio companies struggled to develop their products and did not succeed in the market. Since many of the entrepreneurs had more of a technological background, the WFG focused on providing complementary legal and tax advice. The notion of monitoring, however, was limited to hiring controllers that helped the portfolio companies to develop and maintain their accounting systems (WFG (1977)). While the entrepreneurs welcomed such technical help, strategic advice was neither desired nor accepted. As Fanselow notes

“Entrepreneurs were not very open to a hands-on venture capital approach. I found them arrogant. They did not see that an idea alone does not imply success - they considered themselves as inventors and disliked and disrespected business aspects.”

Beyond monitoring and support, US venture capitalists also hold extensive control rights over the entrepreneurs they finance (Hellmann (1998)). The WFG, however, found out that in order to do business with German entrepreneurs it could not assume any control. Fanselow recalls

“Nobody would have accepted to give up a majority stake to the venture capitalist. People called that exploitation.”

Interviews with entrepreneurs confirmed these strong norms against investor control. Asked for his reasons to choose the WFG, one entrepreneur underlines:

“We were in need of external capital but did not want any hands-on involvement or interference with management. We chose the WFG solely because they offered the best terms.”

Indeed, the WFG only took minority equity positions, did not obtain any of the control rights commonly assumed by US venture capitalists, and thus saw its influence on portfolio companies severely curtailed - companies that in most cases were managed by inexperienced rookie entrepreneurs. Hence Fanselow’s assessment that:



“That is why the failure rate was so high. We could not replace an incompetent management team.”

The WFG could not interfere in any important management decision, and never replaced the founders. By comparison, Hellmann and Puri (2000) examine a sample of Silicon Valley companies and find that professional managers replace more than half of all new entrepreneurs.<sup>7</sup>

The German use of the term venture capital encapsulates two distinct markets. One is an early stage venture capital market for entrepreneurs who want to create new companies that have not yet proven their economic viability. The other is a late stage venture capital market, which in the US might be called non-venture private equity (Fenn, Liang and Prowse (1995)). This market consists of more mature companies which already have established themselves in their markets and that require private equity for growth or capital structure reasons. The agency problems of moral hazard and adverse selection are much more severe in the early stage venture capital market (Gompers (1995)).

If the WFG’s contracts and governance relationships prevented it from solving important agency problems, a natural conjecture is that this should have been particularly harmful to early stage investments. Consider the following excerpt from the 1980 annual report, which tried to explain the poor performance of its portfolio companies (WFG (1980)):

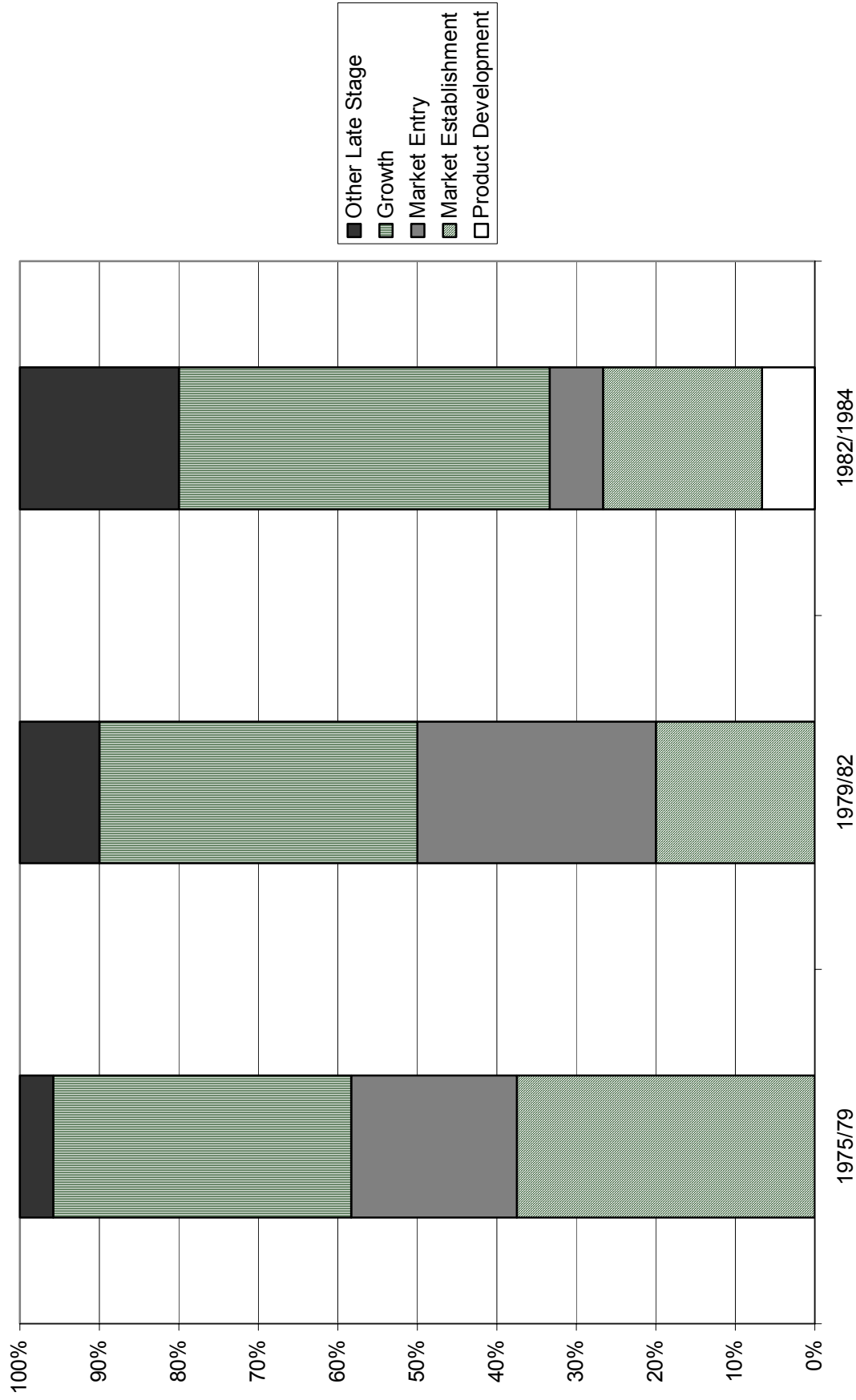
“The lack of experience of the entrepreneurs in mastering the various, very complex tasks of management is the main reason for the failure of the projects. These firms fail in the start-up phase, before one could ever answer the question of whether they would be successful in the market.”

In order to examine this claim more closely, we use the available data from the WFG’s annual reports to examine relationships between a variety of success measures of the WFG and its portfolio mix of early versus late stage investments. Our analysis is constrained by the aggregate nature of the data from the annual reports and a low number of observations; it is nonetheless helpful to identify some broad trends. Figure 7 shows changes in the composition of the WFG’s portfolio. Table 4 shows the results from a series of OLS regressions that look at the effect of the portfolio mix (as measured by the proportion of late stage companies in a year cohort) on the proportion of successful investments in that cohort (as measured by a profitable outcome for the WFG). This SUCCESS-regression shows a strong impact of portfolio maturity on success. Another way of measuring the performance of a venture capital fund is revenues. The average gestation of a venture capital investment is between 4 to 5 years. The results of two GESTATION-regressions show a statistically significant

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<sup>7</sup>Along similar lines, Kaplan and Strömberg (1999) confirm that venture capitalists typically hold controlling positions in the companies they finance. Even at the time of the IPO, Baker and Gompers (1998) find that venture capitalists still hold significant blocks.

Figure 7: Investments by Stage



**Table 4:****The impact of portfolio maturity on investment success**

This table presents the results from a series of OLS regressions. SUCCESS measures the percentage of companies in a particular year cohort that generated a positive return to the WFG. STAGE measures the proportion of companies in a particular year cohort that were classified as being in a growth or other late stage at the time of the WFG's investment. REVENUE are the revenues of the WFG, excluding the government subsidy. STAGE<sub>i</sub> are the i-years lagged values of STAGE. Numbers in parenthesis are t-ratios using White's heteroskedasticity-adjusted standard errors (White, 1980). We also report the correlation coefficient between the dependent and independent variables.

<b>Regression:</b>	<b>SUCCESS</b>	<b>Gestation_4</b>	<b>Gestation_5</b>
Dependent variable	SUCCESS	REVENUE	REVENUE
Intercept	-0.0637433 (-0.914)	0.7803754 (0.988)	1.137789* (1.839)
STAGE	0.4291683*** (4.107)		
STAGE_4		2.485186** (2.733)	
STAGE_5			1.931644* (2.307)
Correlation coefficient	0.7648	0.6292	0.5190
F-statistic	16.87***	7.47**	5.32*
R-squared	0.5849	0.3958	0.2694
# of observations	9	9	9

\* significantly different from zero at the 10% level

\*\* significantly different from zero at the 5% level

\*\*\* significantly different from zero at the 1% level

relationship between the lagged values of the portfolio maturity and the revenues of the WFG.<sup>8</sup> These results all suggest a positive relationship between the stage of companies and the success of the investment portfolio. This is consistent with the notion that the WFG faced more substantial problems with early stage companies, where agency problems were more severe, and where the inability to closely monitor and control mattered most.<sup>9</sup>

A unique contractual arrangement further contributed to the problems of the WFG: the WFG offered entrepreneurs a contract with a buy back option at cost plus some moderate interest - an unusual self-imposed cap on the upside of its investments. Its bylaws also stipulated that the WFG should exit from a company as soon as it became economically viable, which equally limited the potential returns for the WFG. As a consequence, the WFG could find itself in a contractual situation that prevented it from participating in the upside of a deal. Indeed, out of a total of 14 entrepreneurs with profitable businesses, 6 exercised their rights to buy back their shares - which means that the WFG recovered nothing more than its cost on 40% of its successful investments.

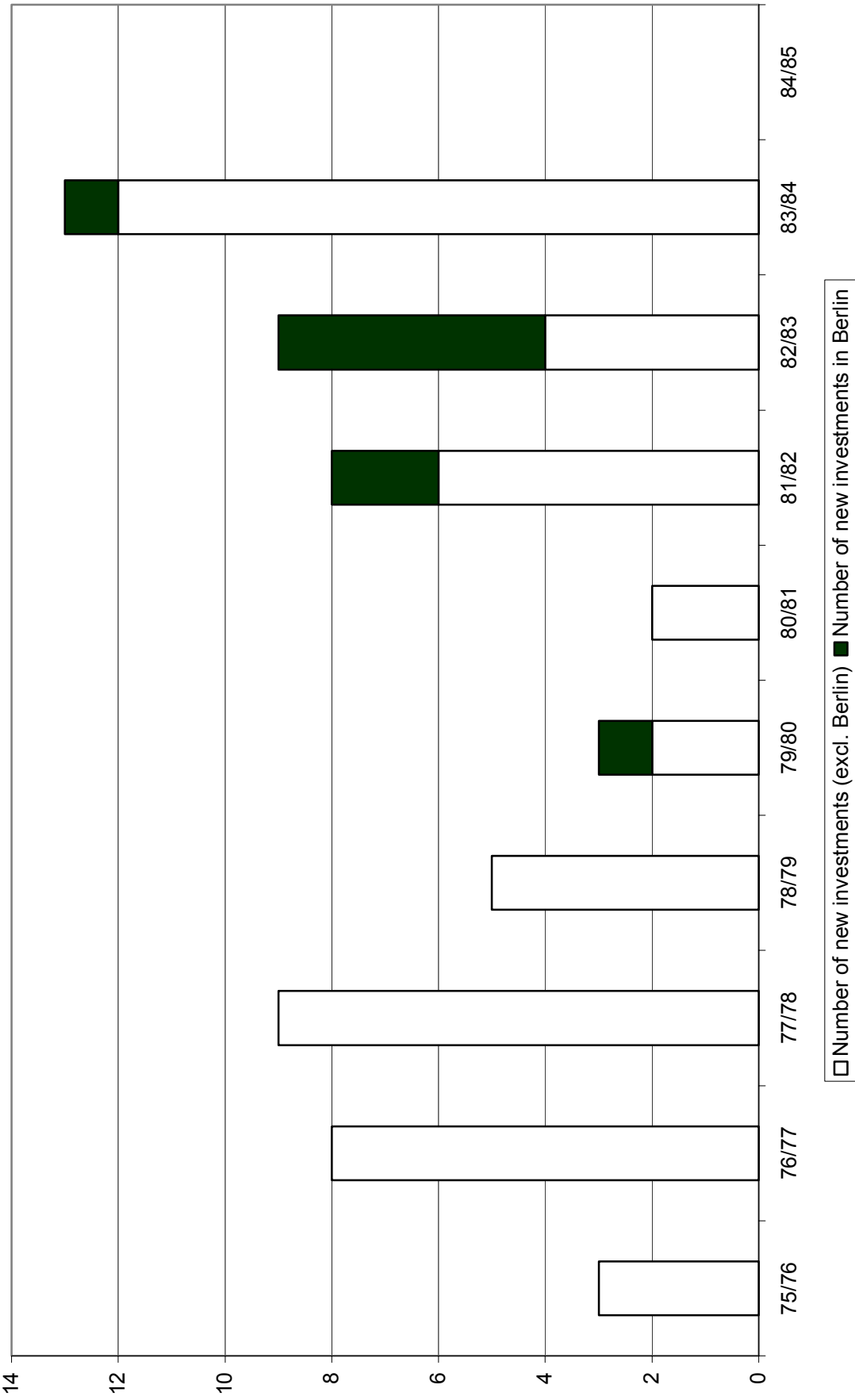
With hindsight it is hard to believe that the WFG ever offered such unfavorable contracts, let alone made investments with so little investor protection. Where did these contracting notions come from? One could conjecture that people simply did not understand venture capital and the consequences of these contracting practices. But this is not true. Just prior to the launch of the WFG, a Professor Gerke (1975) wrote an article in a prominent German economic journal that explained with almost prophetic vision why the approach of the WFG was doomed to fail. Among other things, he explicitly warned against caps on returns or limits on how long the WFG could keep its portfolio companies. If these contracting weaknesses not only could have but in fact *were* anticipated, we face a deeper problem. All the contracting restrictions and governance arrangements favored the entrepreneur over the investor. Some of them reflected the German governance system and were outside the control of the WFG. But others, such as the buy-back provisions, were the WFG's own choice. Why would the shareholders of the WFG impose such restrictions on themselves? This naturally leads us to examine the relationship between the WFG and its own investors: German banks and the government.

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<sup>8</sup>We reran the regression including both lagged variables, and found that both of them were still statistically significant at 10%.

<sup>9</sup>All tests exclude a small number of investments that were made under a special investment program that was explicitly conceived as a political subsidy for promoting West Berlin. See figure 6.

Figure 6: Number of new investments



## 6 The relationship between venture capitalists and their own investors

**Conjecture 2** *The difficulties of the WFG to devise profitable relationships with their entrepreneurs were related to conflicting objectives of its own investors, the government and the established banks.*

To understand the relationship between the WFG and its owners, we first need to retrace the original motivations that led to its creation. Table 3 provides some background to put the creation of the WFG into its historic context. Throughout the sixties, there was a growing concern about an equity gap in Germany. While in the mid-sixties a typical German company still had 35% equity, this percentage had fallen to 25% by the early 1970s. Small and medium sized companies had even less equity, about 20%.<sup>10</sup> After the first oil shock, the problem became even more pressing as higher interest rates burdened the balance sheets of companies. Despite the universal banking laws, banks very rarely held equity in the firms they financed - while they held stock in some of the largest publicly listed companies, they essentially held no equity in private companies, except temporarily in a turn-around situation. The banks' interest in a market for private equity was rather limited. They viewed their loan business as their core activity, and they were reluctant to take on the additional risk exposure. The Herstatt scandal in 1974, the biggest banking failure in the history of Germany, reinforced the risk-aversion of banks. An on-going public debate about the power of banks led to further insecurity. It was commonplace to criticize banks for wielding too much control, especially over the so-called *Mittelstand* (the many small to medium-sized companies that constitute the backbone of the German economy).

The public debate about the equity gap had been paralleled by a debate about a technology-market gap in the German economy. While German universities and research institutions were producing large amounts of high quality scientific output, the transmission of knowledge was seriously lacking. Employment stability in the research sector and the high social status of university professors and research fellows provided little incentive for scientists to commercialize their discoveries. Those researchers who tried to implement their ideas as entrepreneurs often showed a total lack of interest, and skill, as managers.<sup>11</sup> Contacts (not to speak of joint ventures) between academia and industry were rare, partly because universities were almost entirely funded out of state and federal means. As a consequence, while German companies tended to do well in terms of incremental process innovation and growth in existing markets, there was a concern about the lack of adoption of new technologies, and the creation of new products and markets.

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<sup>10</sup>Many German firms also have some pseudo-equity or reserves (called *Rückstellungen*) which may account for another 20% of assets. Still, the fraction of equity remains lower than in the Anglo-Saxon system.

<sup>11</sup>Several venture capitalists expressed a dislike for what they perceived as "academic arrogance." See also FAZ (06/13/83).

**Table 3: Major events preceding the creation of the WFG**

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Date	Description
01/01/74	Price for Libyan oil increases by about 323% relative to the previous year; for Persian Gulf oil by about 213%.
01/07/74	German government expects zero growth for 1974.
03/10/74	German government states its conviction to stick to its policy of high interest rates. Prime rate stays at about 10%.
03/10/74	Nationalization of German banks is seriously discussed. At the annual meeting of the umbrella organization of German banks, a high-ranking government official threatens to introduce legislation to force banks to give up their equity stakes in private companies, unless they comply voluntarily. <sup>1</sup>
03/74	A Harvard Business School study estimates that about 50% of the US direct investments in Germany fail. The same study finds evidence that success is positively related to the size of the equity stake.
03/21/74	German inflation rate rises above 10%.
04/05/74	The spokesman of Deutsche Bank notes in an official statement: “This has been the most difficult year for Deutsche Bank since World War II.”
04/09/74	US prime rate hits 10%.
04/19/74	US GNP shrinks by 5.8%. Inflation rate is at 10.8%.
04/25/74	Günter Guillaume, close adviser and personal friend of German Chancellor Willy Brandt, is arrested for spying on Brandt for the GDR (German Democratic Republic). The ‘Guillaume-affaire’ topples Chancellor Brandt later the same year. He is succeeded by one of his cabinet members, Helmut Schmidt.

(Continued on next page)

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<sup>1</sup> Ironically, this was Karl-Heinz Pöhl, who went on to become one of the most influential presidents of the Deutsche Bundesbank.

**Table 3 (continued): Major events preceding the creation of the WFG**

Date	Description
06/26/74	German banking supervision closes the Herstatt bank because of excessive losses from speculation in exchange rate markets.
06/27/74	Foreigners abandon Deutsch Mark. German stock market falls considerably. Herstatt's holding company estimates the expected losses at DM 10 million.
06/28/74	The umbrella organization of German banks provides a revised estimate of the losses by Herstatt: DM 400 million. The full extent of the crisis is only gradually revealed, with losses of over DM 1.2 billion in Germany alone, and over DM 300 million in the US. A bitter public debate ensues on who should be culpable and financially responsible.
07/22/74	German stock market hits its lowest level in seven years.
08/01/74	German government begins to debate how to strengthen its deposit insurance system.
08/08/74	President Richard Nixon resigns. Gerald Ford is appointed 38 <sup>th</sup> president of the United States.
09/11/74	German government allocates DM 900 million in subsidies for "endangered sectors of the economy."
11/07/74	German unemployment rises by over 20% in one month, from about 2.4% to about 3%.
12/09/74	Kuwait becomes a major stakeholder in Daimler Benz. The union representative on the board of directors publicly states: "Good. As long as it is not General Motors or Ford."
Winter/Spring 74/75	A politically motivated terrorist group, called Bader-Meinhof gang, targets prominent conservative politicians in a series of violent attacks.
02/16/75	Number of bankruptcies increases by 40% compared to the previous year's level, which had already been a post-war record.
06/09/75	Founding of the WFG in Frankfurt am Main, Germany's financial capital.



The creation of the WFG was in response to the public debates about the equity and technology-market gaps. In the German financial system, only banks were credible financiers that could promote venture capital. However reluctant the banks may have been, the government had no other choice but to lean on banks to develop venture capital. From the beginning, there was a divergence of interest between the banks and government along the following lines. The government was most concerned about the technology-market gap. It preferred the WFG to invest in young, high technology companies, and considered it an instrument of public policy. The banks, however, did not want to take on too much risk and were anxious to not appear to be wielding too much power over small firms - a reluctance that led one interviewee to saying that the banks had to be virtually bullied into backing the WFG.

Within this historical context, we now examine more specific evidence that exposes the objectives of government and banks as the owners of the WFG. At the creation of the WFG, its owners specified four criteria for selecting portfolio companies (Mayer and Müller (1991))

1. The product or process of the entrepreneur has to be sufficiently innovative from a technological point of view.
2. There has to be an identified target market, and the company has to have a good chance of becoming profitable.
3. The entrepreneur or entrepreneurial team has to be of a sufficiently high quality and have sufficient business experience to be able to lead the company to success.
4. The WFG will only finance companies that could not have obtained financing from other sources.

The fourth criterion is clearly the most puzzling. It encouraged adverse selection and free riding by entrepreneurs. Indeed, in some cases entrepreneurs used the screening approval of the WFG to raise financing elsewhere. The WFG not only had to spend resources on its lengthy screening process, but it was then prevented from competing for these entrepreneurs.

Where did this odd criterion come from? While the government was concerned about promoting an activity that could crowd out private markets, the criterion also suited those banks that feared competition from the WFG in their core business. Thus both the government and the banks had little incentive to maximize the WFG's profits. Instead they were more concerned about other stakeholders.

The first three criteria identified technology, markets and the entrepreneurial team as key success factors, much along textbook lines. One of the problems of the WFG, however, was to determine the relative importance of the three criteria. The WFG found itself under considerable pressure from the government to invest based on the first criterion. Fanselow recalls:

“(The government representatives) were breathing down my neck, they were controlling my papers, and they kept telling me: Do this! Do that!”

Fanselow even complained about his own employees, many of whom approached their work from a public policy perspective.

“They were unwilling to pay attention to market aspects. They literally refused to inspect firms on location. They were only interested in the technological side of a project, in ideas.”

Fanselow was not alone in seeing this friction. Other interviewees underlined the problem of the WFG with German banks as its owners. Several managers of venture capital funds operating in Germany all expressed the same idea about the relationship of retail banks and venture capital - it does not work:

“Fanselow had a hell of a time sitting with the banks and doing equity. (Retail) bankers can’t do equity.”

“(Retail) bankers don’t make venture capitalists. If they were good enough, they would already be independent.”

A manager of a big bank-operated venture capital firm acknowledged as late as 1999 that

“We don’t even seek majority stakes. We don’t have the know-how for that.”

Apart from lacking the necessary skills, the banks were also concerned about maintaining their outside reputation. The CEO of a major German bank points out (Wirtschaftswoche (03/04/83)):

“Even if the bank is only involved in organizing a deal, we have to succeed in order to preserve our reputation among our clients.”

Moreover, there were no synergistic benefits from working with loan managers of banks. A WFG official noted:

“Our passive deal sourcing approach did not work out. The banks only referred bad deals to us.”

Soon after taking charge, Fanselow challenged the investment approach of the WFG. It was his objective to turn the WFG around into a financially viable and purely market-oriented venture capital firm. After a confrontational board meeting and strong resistance especially from the government-appointed board members, the WFG dropped the fourth criterion. Furthermore, Fanselow received the freedom to

apply the first criterion less rigorously: it became possible to justify investments based on market opportunities instead of technological innovation.<sup>12</sup> Fanselow remembers:

“I told the banks that we wanted to make money. Most banks didn’t like the idea and they didn’t want me to do that.”

The irony is that management fought for shareholder wealth-maximization, whereas the actual shareholders took a stakeholder perspective.

Is there any evidence that these conflicts of interest mattered? Did Fanselow’s confrontation bring about any tangible change? Figure 6 shows how in his first years (1979-82) Fanselow slowed down new investments to focus on stabilizing the WFG. By 1982, however, he launched a new series of investments. Figures 7 and 8 show changes in the portfolio composition across these different investment periods. Fanselow considered the early stage market in his own words “a catastrophe,” yet this was what the government wanted most from the WFG.<sup>13</sup> We therefore examine whether Fanselow’s confrontation with the WFG’s own shareholders had any significant effect. We are interested in testing for structural breaks in the portfolio of the WFG. First, was there a change in the portfolio composition of the WFG in terms of the stage of companies it invested in? And second, was there an improvement in the performance of the fund?

To examine this, we ran a number of tests (see table 5). The Wilcoxon test (also known as Ranksum, or Mann-Whitney test) checks for differences in the distribution of two random vectors. It is non-parametric and distribution free, and hence appropriate when the underlying distribution is non-normal, or the sample size is small. We use rankable information on the stage of portfolio companies as well as their degree of success. STAGE measures the portfolio structure with respect to the stage (maturity) of the venture - it counts the frequency of companies in the following categories: product development and market testing; market entry; and growth and other late stages. SUCCESS measures the portfolio success - the frequency of investments that resulted in a loss (bankruptcy or sale with loss) vs. a sale with gain. We aggregate these two vectors over two sub-samples, namely the time period before Fanselow’s arrival (1976-78) and after (1979-84). Because several of the changes Fanselow initiated were not fully implemented before 1981, we also compare 1976-1978 with 1981-1984. We call this comparison late, and the first early. We want to test whether the data

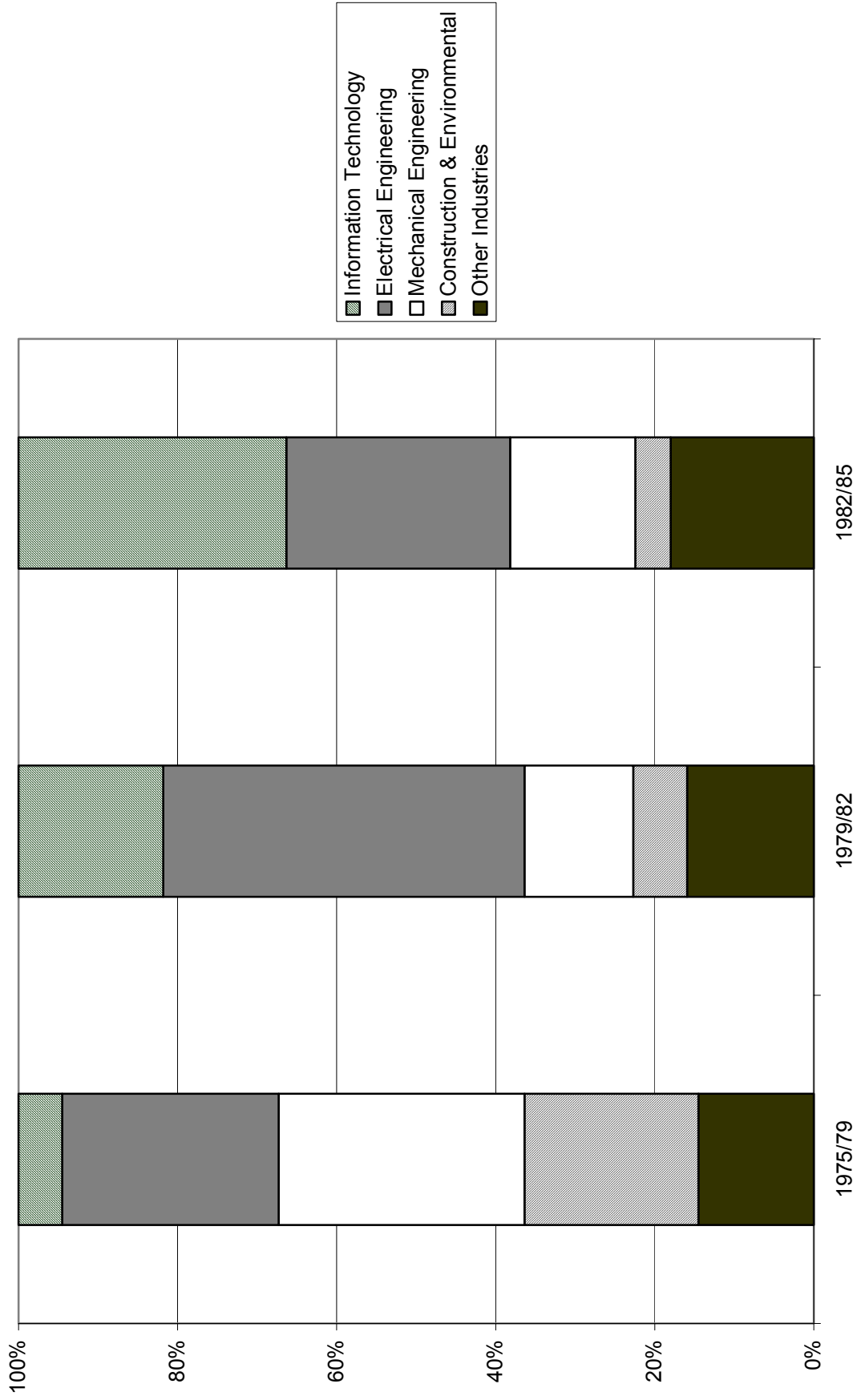
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<sup>12</sup>Fanselow’s confrontation with his own investors was accompanied by a shift of power towards management. Before Fanselow, the board had replaced several CEOs, while the board itself remained mostly unchanged. Under Fanselow, it was board members who were replaced, with a total of nine board changes after 1979.

<sup>13</sup>

Fanselow is hardly alone in his assessment. Another interviewee noted “In the early eighties, it was completely impossible to be successful with early stage investing.”

**Figure 8: Industries of portfolio companies**



**Table 5:**

**Changes in the portfolio structure before and after Fanselow**

This table presents the results from two Wilcoxon rank-sum tests, which is also known as the Wilcoxon-Mann-Whitney test. The vector STAGE\_RANK measures the frequency of companies in the following categories: product development, market testing, market entry, and growth and other late stages. The vector SUCCESS\_RANK measures the frequency of investments with the following outcomes: bankruptcy, sale with loss, sale at cost (buy back), and sale with gain. Both vectors have a natural ordinal (ranking) structure. In the first table we compare the data for 1976-1978 with the data for 1979-1984. In the second table we compare the data for 1976-1978 with the data for 1982-1984. W-statistic is the Wilcoxon statistic of the test. The p-values are based on the known distribution of the Wilcoxon test.

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First table	STAGE_RANK	SUCCESS_RANK
Variance adjusted for ties	11.86	11.86
W-statistic	-1.307	-0.290
p-value	0.1913	0.7715

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Group size	4	4
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Second table	STAGE_RANK	SUCCESS_RANK
Variance adjusted for ties	11.43	11.29
W-statistic	-0.000	-0.447
p-value	1.000	0.6552

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Group size	4	4
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represent independent draws from the same underlying probability distribution before and under Fanselow.

Table 5 shows the test results. Both based on the early and late comparison, we can reject the hypothesis that the distribution of STAGE is the same before and under Fanselow. The result is clearer for the late comparison. This indicates that there was indeed a structural break in the portfolio mix. Did this increase the financial success of the WFG? While the number of successful ventures did increase from 22.5 % before to 29.12 % under Fanselow in the early comparison, and to 42.86 % in the late comparison, the difference is not statistically significant in the early case. In the late case, the results are somewhat significant. It can be argued that the late comparison is more telling because it accounts more fully for the change initiated by and executed under Fanselow. Hence, we have some evidence that there was also a structural break in terms of the success of investments. Given the obvious limitations of the data, we are careful in interpreting these results. The tests, however, are consistent with the notion that there was a change away from the government's initial concept of an early-stage venture capital fund to a later stage private equity fund and that this change was associated with an improvement in the performance of the WFG.

After getting rid of the government in 1984, Fanselow created the WFGneu, which had only five large banks as its shareholders and focused exclusively on non-venture private equity deals. In 1988, the WFGneu was disbanded once again and its portfolio taken over by the newly created DBG with only two banks as its owners. Later the DBG was renamed DBAG and spun off as an independent public company with no bank control. It is currently a leader among Germany's private equity firms. Commenting about the long transition path from the WFG to the DBAG, we were told:

“It was very important to move away from the (retail) banks. Even five banks were still too much.”

By exposing the conflicting objectives of the WFG's owners, we can explain the poor performance and the peculiar contracting practices of the WFG: the structure of the WFG was a product of its institutional environment. We are led to ask whether these problems were specific to the WFG, or whether there were broader institutional factors at work. Did other venture capital firms, which did not suffer from the same institutional path dependence, fare any better? And if not, what were the institutional obstacles faced by venture capital firms, be they domestic or foreign?

## 7 Entrepreneurship as a precondition for venture capital

**Conjecture 3** *The lack of high quality entrepreneurs and entrepreneurial incentives in the German system played a key role in the failure of the WFG, and the venture capital industry at large.*

In trying to untangle what aspects of the WFG's failure can be attributed to its particular structure and what aspects were endemic to the German economic system, it is instructive to look at the experiences of those independent venture capital firms that subsequently entered the German venture capital market. In the early eighties, a number of German venture capital funds modeled themselves after the emerging US example of small independent partnerships. Some Anglo-Saxon funds entered from the US and the UK. These venture capitalists felt the same constraints on their investor rights. Unlike the WFG, which was captive to the banks and government, they could have sought different contracts. They did not. We learned this the hard way. When we asked one venture capitalist whether he had ever considered the possibility of taking a controlling stake in a company, he replied with visible irritation:

“How much do you know about German venture capital to even suggest such an idea?”

Another venture capitalist noted quite explicitly:

“A venture capitalist who had come to Germany with the US mentality would have quickly drowned.”

We have anecdotal evidence for this. When 3I entered the German market in the early 1980s, they had established themselves as a market leader for venture capital in Great Britain. The lead manager for Germany soon realized that any controlling stakes would be impossible, and generally that

“What worked in Britain simply did not work in Germany.”

The independent venture capital funds of the early eighties performed poorly. No fund achieved noteworthy returns, and many lost significant amounts of money.<sup>14</sup> One now very successful venture capitalist sardonically answered how he exited companies in the 1980s:

“I declared them bankrupt.”

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<sup>14</sup>Only three funds from the eighties survive to the present. GENES suffered losses throughout the eighties and early nineties, Hannover survived by focusing mostly on non-venture private equity and TVM diversified into the US to survive.

This evidence suggests that some of the problems of the WFG applied to the market in general. What did the German market miss? The replies we got all agreed: human capital. We were told:

“Anybody assuming entrepreneurial risk would have been considered foolish.”

The UK venture capitalist in Germany said:

“We were struck by the almost complete lack of interesting deals in Europe’s biggest economy. We originally planned on hiring two new managers for our company per year, but there was not even enough to do for these two.”

Why this lack of entrepreneurship? Consider again first the historical context. In the fifties and early sixties a generation of entrepreneurs had built the German after-war economy. By the late sixties, however, the next generation faced a very different set of incentives for entrepreneurship. Young Germans sought to join large companies and banks, which typically provided lifetime employment at high wages and excellent benefits combined with high social status. Given such life-time employment, an employee that left a corporation - say to start her own business - could not expect to be rehired by that company and would have faced considerable obstacles to later take a comparable job with another corporation.<sup>15</sup> We heard:

“Success was viewed negatively and with jealousy. And if an entrepreneur failed, then his career was over.”

This quote neatly summarizes the entrepreneurs’ dilemma in Germany. Successful entrepreneurs were to face envy. High tax rates limited the returns to an entrepreneurial venture.<sup>16</sup> And failure would not only earn negative social stigma, it might financially ruin the entrepreneur. While German bankruptcy laws are similar to those in many developed countries, it was standard practice for banks to require personal guarantees from entrepreneurs.

In the seventies and eighties, the social status of entrepreneurs in Germany was far from glamorous, in a way that is hard to imagine from an Anglo-Saxon perspective (from a contemporaneous German perspective as well). In the seventies, market capitalism was far from being embraced by the younger generation (which would constitute a pool of potential entrepreneurs). The youth organization of the then ruling

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<sup>15</sup>See, for example, Freeman (1998) or *Wirtschaftswoche* (03/04/83, 03/11/83). Germans were even very reluctant to change positions within a corporation (see *FAZ* (09/11/74)). Szyperki and Klandt (1983) also note that in Germany young enterprises had great difficulty in hiring the most talented engineers.

<sup>16</sup>See Nevermann and Falk (1986) for a thorough treatment of the tax difference between Germany and the US at the time.



socialist party (JUSOS) openly declared their hostility to a market economy and demanded the socialization of much of private enterprise.<sup>17</sup> But this level of skepticism was not just held by left-wingers. A public opinion poll from 1974 conveys how negatively many Germans viewed their entrepreneurs (FAZ (09/12/74)). 36% supported partial or complete abolition of private ownership of companies and banks. 50% believed that the cause of inflation was that “entrepreneurs made too much profit.” 27% believed that the only thing that entrepreneurs did was “to profit from other people’s work.” And only 41% believed that entrepreneurs could be “competent.” Some got so disenchanted with Germany’s social market economy that a small minority eventually resorted to various violent forms of terrorism. Table 3 provides some further historical background about the political and economic conditions.

Hardly surprising that so few people desired to be entrepreneurs. Yet lack of incentives affected not just the quantity, but also the quality of entrepreneurs. The 1984 annual report of the WFG extensively discussed the German venture capital market (WFG (1984), underline original):

“We would welcome if the general discussion would focus more on where the discrepancy between supply and demand lies. We want to point out here that, in our opinion, it is very important for the German venture capital market that experienced managers and experienced teams become the ones demanding venture capital, by becoming entrepreneurs through start-ups, spin-offs or buy-outs.”

One interviewee explained:

“Back then the most promising young people wanted to work for Siemens or Nixdorf. Entrepreneurship was taken up by those who could not make it in large companies - companies that occasionally actively *encouraged* them to leave.”

The WFG kept fairly detailed records on the number of entrepreneurs that approached it for funding - an average of 150 business plans per year. Given that in the early years the WFG was a monopolist in Germany, this is a tiny number. Today, one medium-sized US venture capital firm may well get a thousand business plans per year. Beyond their sheer number, venture capitalists care about the quality of the entrepreneurs that approach them for financing. We therefore examine the WFG’s data on business plans. The WFG carefully tracked the selection process of business plans, and so there is data on how many of them received further attention. The screening process identified those companies that met some quality threshold, and the WFG would make its final selection from these. The percentage of companies that met the screening threshold is a natural measure of the quality of entrepreneurs. We define

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<sup>17</sup>See for example, FAZ (09/12/74, 11/29/74, 09/01/75). Anecdotically, the current German chancellor, Gerhard Schröder, became the leader of the JUSOS in 1978.

QUALITY as the ratio of the number of firms that passed the quality screen, over the number of firms applying to the WFG. We then examine how this quality measure relates to the success of the WFG (table 6). We find a statistically significant, positive impact. Hence, there is evidence that is consistent with the notion that the quality of entrepreneurs is important for the success of a venture capital fund. The success rate of the venture capital fund may also depend on the number of bets made. We therefore reran the regression, controlling for CHOICE, which measures the ratio of the number of companies that the WFG actually invested in over the number of companies that passed the screen. We find that the inclusion of CHOICE does not alter our results.

Let's summarize how the three hypotheses interact so far. The inability to exercise governance control over its portfolio companies exposed the WFG gravely to the quality of the entrepreneurs. Once they had invested in a company, they had to live with the entrepreneur. Therefore, the government's refusal to pay attention to any investment criterion other than the technological merit was particularly questionable.

## 8 Stock markets and venture capital

**Conjecture 4** *The existence of an active stock market is a necessary, but not a sufficient condition for the development of an active venture capital industry.*

Black and Gilson (1997) argue that venture capital cannot flourish in a bank-based system. Venture capitalists assume extensive control rights. An active stock market helps the investors to exit and entrepreneurs to regain control over their companies. Therefore, the lack of an active stock market in Germany, they believe, prevented the emergence of a German venture capital industry.

While the Black and Gilson conjecture correctly identifies the importance of a stock market, a more careful analysis of the evidence suggests a subtler picture. The introduction of an active stock market alone does not ease the contractual problems between entrepreneurs and investors. The Black and Gilson argument relies on the assumption that investors take control before the IPO and that entrepreneurs regain control after. While this assumption may be valid for the US, we have seen that in Germany investors had great difficulty to take control rights away from entrepreneurs.

Moreover, while it is true that Germany's IPO market was very small - only 17 companies were newly listed on German stock exchanges from 1977 to 1982 (the US saw 448 IPOs in 1981 alone) -, the WFG nevertheless was able to take two companies public. Given that it had at total of eight successful companies (after buy-backs), a rate of 25 % of IPOs among successful investments is not low and hardly responsible for the WFG's problems.

It might help to look at these apparent contradictions using the theory of complementarities. We have seen that the old German equilibrium was characterized by a lack of entrepreneurial spirit and risk-taking. We heard:

**Table 6:**

**The impact of entrepreneurial quality on success**

This table presents the results of two OLS regressions. QUALITY is defined as the ratio of the number of business proposals considered interesting by the WFG over the total number of proposals in a particular year cohort. CHOICE is defined as the ratio of the number of new investments over the number of interesting business proposals in a particular year cohort. SUCCESS measures the percentage of companies that generated a positive return to the WFG in a particular year cohort. Numbers in parenthesis are t-ratios using White's heteroskedasticity-adjusted standard errors (White, 1980). We also report the correlation coefficient between the dependent and independent variables.

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<b>Regression</b>	<b>QUALITY</b>	<b>QUALITY and CHOICE</b>
Dependent variable	SUCCESS	SUCCESS
Intercept	0.0195166 (0.164)	0.0605712 (0.317)
QUALITY	0.2436266* (2.327)	0.352152* (2.337)
CHOICE		-1.283053 (-0.522)
Correlation coefficient	0.4386	0.4386
F-statistic	5.41*	7.13**
R-squared	0.1924	0.2391
# of observations	9	9

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\* significantly different from zero at the 10% level

\*\* significantly different from zero at the 5% level

\*\*\* significantly different from zero at the 1% level

“Availability of money was never the problem. The entrepreneurial environment always was.”

The theory of complementarities predicts that a change in one component will only work if it generates further changes in the system. The mere creation of the WFG was not sufficient for an institutional change. Furthermore, the WFG had virtually no visibility - while it tried to overcome its lack of visibility with a series of promotional campaigns, they were too small and had no success (WFG (1979)). The process of deal origination was described as:

“We tended to look around and then stumble across some deal. Most recipients had never even heard about venture capital.”

Under these circumstances, it is hardly surprising that the WFG did not reshape the entrepreneurial attitudes in Germany. Or as a manager familiar with the WFG for decades said:

“It was as if the WFG had never happened at all.”

But the mere creation of a stock market segment better suited for venture capital does not create a flourishing venture capital industry either. In 1987 the Geregelter Markt was introduced in Germany. It catered specifically to the needs of venture capital backed firms (Harrison (1988)). However, the creation had virtually no effect on the development of a venture capital industry; specifically, it did not increase the inclination of managers to create small ventures or to work for them.

Recently, things have changed dramatically (see Fiedler and Hellmann, 2001). Younger Germans have much greater exposure to US influences, to Silicon Valley and the Internet. In the words of one manager:

“The attitude toward risk is changing today, for the generation of thirty year old, especially in IT, telecom or biotech. These young people either studied in the Anglo-Saxon world, or they worked for an Anglo-Saxon company. They bring a new way of thinking. They are no longer content to just be the assistant to the CEO.”

Fanselow (himself in his fifties) had an even more direct way of saying this:

“Today, you can find young managers who are willing to take on risks, who want to be entrepreneurs. But you can forget anyone over 30 or 35.”

It is in this environment that the latest attempt to create a new stock market segment for entrepreneurial companies, the so-called Neuer Markt, finally succeeded.

And within the context of these complementary and system-wide changes, the German venture capital market finally also took off in the last few years.<sup>18</sup> The Neuer Markt itself did not create this broader societal trend. As part of a complementary system, however, it has undoubtedly contributed to it, especially by providing highly visible role models for a new generation of entrepreneurs. One interviewee noted:

“Today, we have our first millionaires under 30, and everybody knows that.”

While access to an active stock market is a necessary condition for the development of a venture capital industry, it is not sufficient. An active stock market needs to be embedded into an environment that has broader incentives for talented managers to become entrepreneurs. As predicted by the theory of complementarities, a change in a complementary system (here the introduction of a new stock market segment) can only be effective if it interacts with other changes in the environment (here the willingness of talented Germans to engage in entrepreneurial activities).

## 9 Conclusion

New theories of corporate governance emphasize complementarities between institutions. This paper looks at the dark side of these complementarities: what happens if a new institution clashes with the existing system? It studies the natural experiment of the WFG, a venture capital firm that was explicitly created to initiate a German venture capital market. We noted the difficulties that the WFG encountered in implementing venture capital in a bank-based system, and analyzed how the WFG adjusted the concept of venture capital to better fit the German institutional context.

The paper emphasizes a central tenant from the theory of complementarities, namely that a single deviation in an institutional equilibrium is unprofitable. Successful institutional innovation requires several changes at a time. It shows how the introduction of the first German venture capital fund did not fit into the environment. German norms on contracting and corporate governance provided insufficient investor protection, especially for the financing of early stage, high-risk ventures. It also shows how the institutional environment itself shapes the motivation of the agents that initiate institutional change - how the incumbent players, the leading German banks, had greater concern for preserving their existing business and reputation than for seeking success of new ventures.

The paper then analyzes the larger systemic constraints that had to be relaxed before a German venture capital market finally could develop. It was not so much the quantity as the quality of entrepreneurs that was lacking. And finally, the paper

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<sup>18</sup>See Johnson (1999) for an analysis of the Neuer Markt. Kümmerle, Paul and Freye (1998) or Pfirrmann, Wupperfeld and Lerner (1997) also provide an overview of recent developments in the German venture capital industry.

reinterprets the Black and Gilson hypothesis on the importance of an active stock market for venture capital. It suggests that an active IPO market is a necessary, but by no means a sufficient condition. Venture capital, especially in a bank-based system, might also need complementary changes of corporate governance and of a country's attitude towards entrepreneurship.

The history of the WFG and the development of German venture capital is not a happy one. But learning from failure is just as important as learning from success. The failure of the WFG provides a rare natural experiment that allows us to study the economic forces that contribute to the viability of a venture capital industry. In an area such as venture capital where relatively little is known about what creates a favorable environment it would be foolish to ignore the few lessons that history affords us.

## References

- [1] Admati, A., P. Pfleiderer. 1994. Robust financial contracting and the role of venture capitalists. *Journal of Finance* **49** 371-402.
- [2] Allen, F., D. Gale. *Comparing financial systems*. The MIT Press, Cambridge, Massachusetts 2000.
- [3] Aoki, M., H. Patrick. *The Japanese main bank system: its relevance for developing and transforming economies*. Oxford University Press, New York 1994.
- [4] ———. *Towards a comparative institutional analysis*. The MIT Press, Cambridge, Massachusetts 2000.
- [5] Baker, M., P. Gompers. 1998, An analysis of executive compensation, ownership, and control in closely held firms. Mimeo, Harvard Business School.
- [6] Bebchuk, L., M. Roe. 1999. A theory of path dependence in corporate ownership and governance. *Stanford Law Review* **52** 127.
- [7] Berglöf, E. 1994. A control theory of venture capital. *Finance Journal of Law, Economics and Organization* **10** 247-267.
- [8] Bhattacharya, S., A. Thakor, A. 1993. Contemporary banking theory. *Journal of Financial Intermediation* **3** 2-50.
- [9] Black, B. S., R. J. Gilson. 1997. Venture capital and the structure of capital markets: banks versus stock markets. *Journal of Financial Economics* **47** 243-277.
- [10] Boot, A., A. Thakor. 1997. Financial system architecture. *Review of Financial Studies* **10**, 1099-1131.
- [11] Büschgen, H. E. 1985. Banken und Venture Capital Finanzierung, Wagnisfinanzierung. *Die Bank* **6** 284-292.
- [12] Bygrave, W., J. Timmons. *Venture capital at the crossroads*. Harvard Business School Press Boston, Massachusetts 1992.
- [13] Caginalp, G., D. Porter, V. Smith. 1998. Initial cash/asset ratio and asset prices: An experimental study. *Proc. Natl. Acad. Sci. USA* **95** 756-761
- [14] Demirgüç-Kunt, A., Maksimovic, V., 1999. Institutions, financial markets, and the firm debt maturity. *Journal of Financial Economics* **54** 295-336.
- [15] Diamond, D. 1984. Financial intermediation and delegated monitoring. *Review of Economic Studies* **51** 393-414.

- [16] Fama, E. 1985. What's different about banks? *Journal of Monetary Economics* **15** 29-39.
- [17] Fanselow, K. H.. 1983. Wagnisfinanzierungsgesellschaft. *Zeitschrift für das gesamte Kreditwesen* **6** 241-243.
- [18] ———. 1985. Meinungsspiegel. *Betriebswirtschaftliche Forschung und Praxis* **5** 453-469.
- [19] ———, H. Stedler. 1988. Venture Capital in Deutschland. *Die Bank* **10** 554-560.
- [20] FAZ (Frankfurter Allgemeine Zeitung). 1975. Wagnisfinanzierung für den Mittelstand **03/11/75** 11.
- [21] ———. 1974. Die Sicherheit des Arbeitsplatzes **09/11/74** 11.
- [22] ———. 1974. Die soziale Marktwirtschaft im Urteil der Bevölkerung **09/12/74** 12.
- [23] ———. 1974. Bonn entdeckt die Unternehmer **11/29/74** 12.
- [24] ———. 1975. Korrektur eines Zerrbildes **09/01/75** 11.
- [25] ———. 1983. Deutschen Technikern fehlt oft bei der Beziehung zum Markt **06/13/83** 12.
- [26] Fenn, G., N. Liang, S. Prowse. 1995. The economics of private equity markets. Staff Study 168, Board of Governors of the Federal Reserve System.
- [27] Fiedler, M., and T. Hellmann, Against all odds: the late but rapid development of the German venture capital industry, *The Journal of Private Equity*, Fall 2001, 4(4), 31-45
- [28] Freeman, J. 1998. Venture capital and growth businesses in Germany. Mimeo, University of California, Berkeley.
- [29] Gerke, W. 1975. Was kann die Wagnis-finanzierungs-GmbH (WFG) leisten? *Zeitschrift für das gesamte Kreditwesen* 761-763.
- [30] Gilson, R. 1996. Corporate governance and economic efficiency. *Washington University Law Quarterly* **74** 327-345.
- [31] ———, M. Roe. 1993. Understanding the Japanese keiretsu: Overlaps Between Corporate Governance and Industrial Organization. *Yale Law Review* **102** 871.
- [32] Gompers, P. 1995. Optimal investment, monitoring, and the staging of venture capital. *Journal of Finance* **50** 1461-1489.
- [33] ———, J. Lerner. 1998. What drives venture capital fundraising? *Brookings Papers on Economic Activity, Microeconomics, 1998*, 149-192.
- [34] ———, J. Lerner. *The venture capital cycle*. The MIT Press, Cambridge, Massachusetts 1999.



- [35] Harrison, M. E. *The West German Venture Capital Market*. Peter Lang, Frankfurt am Main - Bern - New York - Paris 1988.
- [36] Hellmann, T. 1998. The allocation of control rights in venture capital contracts. *Rand Journal of Economics* **29** 57-76.
- [37] Hellmann, T. 2002. IPOs, Acquisitions, and the Use of Convertible Securities. Stanford GSB, Working Paper, 2002
- [38] ———, M. Puri, M. 1999. The interaction between product market and financing strategy: the role of venture capital. Forthcoming *Review of Financial Studies*.
- [39] ———, T., M. Puri. 2000. Venture capital and the professionalization of start-up firms: empirical evidence. Mimeo, Stanford University.
- [40] Jeng, L., P. Wells. 1997. The determinants of venture capital funding: an empirical analysis. Mimeo, Harvard Business School.
- [41] Jensen, M., W. Meckling, 1976. The theory of the firm: managerial behavior, agency costs, and ownership structure. *Journal of Financial Economics* **3** 305-60.
- [42] Johnson, S. 1999. The Neuer Markt. Mimeo, MIT.
- [43] Kaplan, S., P. Strömberg. 1999. Financial contracting meets the real world: an empirical study of venture capital contracts. Mimeo, University of Chicago.
- [44] Kokalj, L., H. Albach. 1987. Der deutsche Venture Capital Markt. *Die Bank* **7** 358-366.
- [45] Kümmerle, W., F. Paul, H. Freye. 1998. Survey of private equity in Germany - summary of results and analysis. Mimeo, Harvard Business School, 98-112.
- [46] La Porta, R., F. Lopez-de-Silanes, A. Shleifer, R. Vishny. 1997. Legal determinants of external finance. *Journal of Finance* **52** 1131-1150.
- [47] ———, F. Lopez-de-Silanes, A. Shleifer, R. Vishny. 1999. Corporate ownership around the world. *Journal of Finance* **54** 471-517.
- [48] Lerner, J. 1995. Venture capitalists and the oversight of private firms. *Journal of Finance* **50** 301-318.
- [49] Mayer, M., R. Müller. 1991. Die Deutsche Wagnisfinanzierungs-Gesellschaft mbH (WFG) - Erfahrungen und Ergebnisse eines Modellvorhabens. Mimeo, Fraunhofer-Institut für Systemtechnik und Innovationsforschung, ISI-B-20-91.
- [50] Milgrom, P., J. Roberts. 1990. The economics of modern manufacturing: technology, strategy and organization. *American Economic Review* **80** 511-528.

- [51] ———, J. Roberts. 1994. Complementarities and systems: understanding Japanese economic organization. *Estudios Economicos* **9** 3-42.
- [52] ———, J. Roberts. 1995. Complementarities and fit: strategy, structure and organizational change in manufacturing. *Journal of Accounting and Economics* **19** 179-208.
- [53] Milhaupt, C.. 1997. The market for innovation in the United States and Japan: venture capital and the comparative governance debate. *Northwestern University Law Review*, **91** 865-898.
- [54] Nevermann, H., D. Falk. *Venture Capital-Ein betriebswirtschaftlicher und steuerlicher Vergleich zwischen den USA und der Bundesrepublik Deutschland*. Nomos Verlagsgesellschaft, Baden-Baden 1986.
- [55] Pfirmann, O., U. Wupperfeld, and J. Lerner, *Venture capital and the new technology based firms*, 1997, Physica-Verlag, Heidelberg
- [56] Pohl, M. 1978. Die Deutsche Wagnisfinanzierungsgesellschaft. *Sparkasse* **3** 78-81.
- [57] Roe, M. 1998. German securities markets and German codetermination. *Columbia Business Law Review* **98** 167.
- [58] Sahlman, W. 1990. The structure and governance of venture capital organizations. *Journal of Financial Economics* **27** 473-521.
- [59] Schmidt, R. H. 1988. Venture Capital in Deutschland - ein Problem der Qualität. *Die Bank* **4** 184-188.
- [60] ———, M. Willms. 1987. *Venture Capital in Germany*. Mimeo, University of Trier.
- [61] Stedler, H. R. 1993. Beteiligungskapital im bankbetrieblichen Leistungsangebot. *Die Bank* **6** 347-351.
- [62] Stiglitz, J. E. 1985. Credit Markets and the control of capital. *Journal of Money, Credit and Banking* **17** 133-152.
- [63] Szyperski, N., H. Klandt. 1984. An empirical analysis of venture management activities by German industrial firms. *Frontier of Entrepreneurship Research* , Babson College, 347-357.
- [64] White, H. 1980. A heteroscedasticity-consistent covariance matrix estimator and a direct test for heteroscedasticity. *Econometrica* **4** 817-838.
- [65] Deutsche Wagnisfinanzierungsgesellschaft mbH (WFG). Annual Reports, 1975-1992. Frankfurt a. Main
- [66] Wirtschaftswoche. 1983. Risikokapital (I): Durststrecke für Pioniere. **10** 32-44.
- [67] ———. 1983. Risikokapital (II): Bis zum Erfolg betreuen. **11** 46-59.

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