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Early Stage Investments in New Technology Based Firms - Analyzing the Changing German Landscape of Venture Capital Finance in the Light of Capital Market Theory and New Institutional Economics

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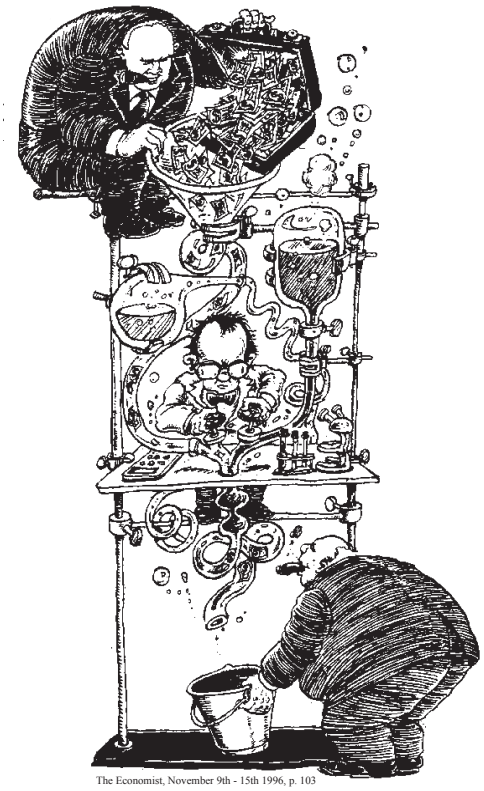

The Economist, November 9th - 15th 1996, p. 103

Diplomarbeit

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von
Holger Ludewig

Contents

> "If you want to get rich, it might seem that you need only follow this simple formula. First, find a nerd with a garage and a good idea. Next, warm him up with visions of Gatesian glory, administer a heavy dose of management jargon, and add a million dollars. Then wait a decade and hope that you get lucky."
> The quotation and the drawing on the front page are taken from the article "From labs to riches", The Economist, 1996, November 9th, p. 103 - 104

1 Introduction

In recent years the issue of early stage investment in new technology based firms has drawn considerable attention. Its relevance emerges from the rise of high technology industries in the global economy.

In a special issue on "The 21st Century Economy", "an economy that, driven by technological progress, can grow at a 3 % pace for years to come"[1], Business Week's Michael Mandel (1998, p. 28) notes:

> "In the long run, the success of the 21st Century Economy will depend on whether technological progress will continue to drive growth, as it has so far in this decade. That would be a big change from the 1970s and 1980s. In those decades of economic stagnation, technology contributed almost nothing to growth, ... in the 1990s, the innovations have been coming thick and fast. ... The innovations wave has also being given more force by the globalization of the economy."

As competition in established, mature industries all over the world is ever increasing, the importance of keeping up and increasing the speed of innovation to ensure competitiveness of companies and national wealth is widely recognized.[2]

Innovation may concern products or processes. It refers to the development of new proprietary knowledge, i. e. technology, which is embodied in marketable products or services[3]. In as far as the added "private" knowledge increases the utility of a product to the customers, it adds value (Kim and Mauborgne 1998). Unless the new features of a product are matched by competitors, a company may earn innovation rents. Thus proprietary knowledge attained through innovation is an important source of strategic advantage.[4]

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1 Business Week (August 31st, 1998), p. 24

2 e. g. Smith (1776), Schumpeter (1912 and 1961), Porter (1990), Vernon (1966 and 1980), Acs and Audretsch (1991), Hitt, Ireland and Hoskisson (1995), Evans and Wurster (1997), Iansiti and MacCormack (1997), Eisenhardt and Brown (1998)

3 e. g. Albach, Hunsdiek and Kokalj (1986), Albach (1989), Dunning (1993)

4 Process innovation may yield similar benefits, in that production costs may be diminished by the application of innovative, proprietary production technologies or in that unique features, formerly not realizable may be added to a product. In case of process innovation, rents may thus be earned by broadening the span between production cost and market price or by allowing for new valued product features.
e. g. Porter (1980 and 1985), Lengnick-Hall (1992), Lieberman and Montgomery (1988), Prahalad and Hamel (1990), Dunning (1993), Hitt, Ireland and Hoskisson (1995)

In a competitive, dynamic market, however innovation rents are not sustainable. Competitors will attempt to match and exceed the innovation advantage. This may be achieved by imitation or by adding other or more innovative features. Whereas following the product life cycle model initial growth may be steep and rents may be high for the first mover (Lieberman and Montgomery 1988), imitators competing on price and other rivals competing on innovations, may inflate the monopolistic power of the proprietary knowledge. Striving to maintain and increase market shares and profitability, companies thus have a strong incentive to keep innovating.[5]

For new technology-based firms the importance of proprietary knowledge is particularly pronounced. These start-ups operate in a hostile competitive environment, characterized by high uncertainty, offering the potential for rapid growth and high profits on the upside, but als the substantial threat of incurring deep losses on the downside.[6] Whereas large companies generally possess a diversified product portfolio and a host of strategic assets, small companies will need to compete on a single new product or service and the determination of its management team.[7]

Politicians, worried by high unemployment and budget deficits, lately fell in love with the high-technology start-ups for their ability to create jobs and ensure future tax revenues.[8] New

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[5] Mandel (1998, p. 28) reminds, that "[i]n part, the sudden re-emergence of technological progress is the culmination of years of research in disparate fields that are finally reaching critical mass."

Business Week (1998, p. 24) holds however, that "[t]he innovation pipeline is fuller than it has ever been in decades." The magazin also expects (p. 29), that "[i]ncreasing globalization will simultaneously provide much larger markets and tough foreign competitors. The result: Companies will have even more incentive to innovate while cutting costs."

[6] Firms entering industries characterized by a high degree of innovative activity face a greater prospect of growth, but they are also burdened with a lower likelihood of survival. e. g. Audretsch (1995), Audretsch and Mahmood (1995), Mahmood (1992),

see also Pfirrmann, Wupperfeld and Lerner 1997, Gross and Port 1998

[7] Schumpeter (1942 p. 134 - 175), for all his appreciation of the entrepreneur, thought, that large companies have a stronger incentive and are better suited to innovate, since they may exploit monopolistic advantages to a greater extent.

Scherer (1984, p. 224) holds however, that "smaller firms are disproportionally prolific contributors to the generation of important technological innovations" whereas "[l]arge corporations barely pull their weight." see also Scherer (1988) on innovation advantages of small firms and Röpke (1977, p. 150 f.)

Acs and Audretsch (1990) support Scherer's argument, saying that small firms have innovative advantages in a number of industries, particularly in high technology industries.

see also Williamson (1975, p. 205 f.) and *3.2.2 Strategic Investors: Corporate Venture Capitalists*

[8] According to a survey of the tbg 400 new technology-based firms are started each year. NTBFs

technology-based firms are drivers of structural change in the economy in that they are among the first to enter new high growth potential industries.[9]

For Germany it turns out however, that while it is easy to go out of business, proven by an ever rising insolvency rate, getting started is far more difficult. The major complaint is that it is troublesome to impossible to raise the needed funds.[10] New technology-based firms for their high capital needs for research and development from an early stage are particularly impaired by the financing problem.[11]

What is puzzling about the early stage segment of the capital market is, that while would-be entrepreneurs complain about the lack of capital supply, investor claim they have the money ready, but face problems to find enough "good" projects.[12] The contrasting statements may indicate in part a market failure situation in the German finance system.[13]

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according to the survey create four times more jobs than average founders. Three years after formation they employ an average of 18 people, in the fourth year 23. (FAZ 31.12.97).

Business Week (1998, August 31st, p. 26) expects that "[t]he innovation boom, and the faster growth rate it could ignite, could make it much easier to address some of the vexing social and environmental problems of the 21st century." e. g. expenditure for social insurances, retirement, protection of the environment, employment, etc..

see also Porter (1990)

Looking at new technology industries and small business formation's role for job creation in the US, Brock (1997, p. 9) points out, that "[i]n 1980, we had 101 million workers in the U.S.. If I had known that 42 million would lose their jobs over the next 16 years, I would have predicted that when I wake up in 1996, the unemployment rate would be 15 percent. But it was 4.9 percent because 72 million new jobs in fact were created in 17 years, with a net gain of 30 million jobs.... How did the nation that fired everybody hire everybody?"

Because of the regained public awareness of economic dynamics and the role of the entrepreneur, as Bös and Stolper (1984) comparing Keynes and Schumpeter foresaw, Schumpeter experiences a revival as the "political economist of the 1990s" (Stopler 1984, p. 1).

[9] e. g. Giersch (1984), Hax (1989), Gahlen, Meyer, Schumann (1989), Birch (1984), Audretsch and Fritsch (1994), Scherer (1984 and 1988), Acs and Audretsch (1990), Pfirrmann, Wupperfeld and Lerner (1997), Wissenschaftlicher Beirat beim Bundesministerium für Wirtschaft (1997)

[10] "It is well known, that small companies have few opportunities to gain access to stock markets." (Pfirrmann, Wupperfeld and Lerner, 1997, p. 3)

Discriminatory capital market acces may act as an entry barrier to products and service market (Hitt, Ireland and Hoskisson, 1995, p. 49).

see also Appendix II

[11] "The birth of new firms depends upon the availability of venture capital." (Cooper 1970, p. 75). Under 3.3 *How "hot" is it really?*, I will argue, that Cooper's statement perhaps over-emphasizes the importance of venture capital. Looking at the big picture however it may nevertheless hold true.

see also e. g. Pfirrmann, Wupperfeld and Lerner (1997), Laub (1991), Stedler (1996), Wossidlo (1985)

[12] see Appendix II 1 *The German Capital Market so far*

[13] "These imperfections in the capital market with respect to supplying finance to smaller firms are primarily seen in the ability of external investors to evaluate the quality of investment opportunities." (Pfirrmann, Wupperfeld and Lerner 1997, p. 3)

see also Allen and Gayle (1994)

This paper will therefore examine the peculiarities of early stage investments in new technology-based firms, identify causes of financing problems and propose how recent changes in the microstructure of the German capital market may help to reduce or surpass imperfections, to increase the volume of early stage investments in technology start-ups.
Early stage investments in new technology-based firm are a subset of venture capital investments. Venture Capital has been an often heard term in public discussion, however for lack of a common definition is often misunderstood. It will therefore be one aim of this paper to develop a useful definition for venture capital and to distinguish it in particular from the private equity term. This will be undertaken in the following section 2.1. An introduction to early stage investing 2.2 and the new technology-based firm 2.3 follows.

Section 3 maps out the landscape of venture capital finance in Germany with some reference to international developments.

Section 4 will analyze how venture capital and the *Neuer Markt* as secondary institutions of the German venture capital market economize on transaction and agency costs as well as on uncertainty involved with early stage investments in new technology based firms.

On the creative or discovery part of this paper I will introduce the model of a new governance structure - the *V-CTORY*.

Section 5 draws the conclusion on this paper and provides an outlook on the continuing development of the venture capital market in Germany and beyond.

The appendices contain additional information. Appendix I features a case study of Gulfstream Aerospace Corp.. Appendix II provides an update on recent important changes in the German venture capital and private equity market. Appendix III makes explicit the underlying neoclassical capital market -, transaction cost - and principal-agent-theory used in analyzes throughout the paper. Appendix IV contains a comprehensive outlook and educated judgment about the future development of the private equity and venture capital market in Germany.

2 Venture Capital Finance and the New Technology Based Firm NTBF

2.1 Telling the difference: Venture Capital and Private Equity

2.1.1 What is Venture Capital?

Various definitions of venture capital have emerged with time.[14] They mainly differ in the broadness of their conceptual extent.

Liles (1974, p. 461) provides an overview of the "spectrum of definitions of venture capital investing", including the following:

> „1. Investing in any high-risk financial venture
> 2. Investing in unproven ideas, products or start-up situations; i. e. the provision of what is called 'seed capital'
> 3. Investing in going concerns that are unable to raise funds from conventional public or commercial sources
> 4. Investing in large and - in some cases - controlling interests in publicly traded companies where there is a considerable degree of uncertainty."[15]

Pfirrmann, Wupperfeld and Lerner (1997, p. 10) note, in looking at the venture capital intermediating institutions that a current "comprehensive description of venture capital companies has to include the following activities:"

> "PInvestment in the seed, start-up and other early stages
> PInvestment in established companies that are unable to finance their expansion through banks or the stock exchange
> PInvestment in management buyouts and leveraged buyouts
> PInvestment on the stock exchange where patient, supportive investment can facilitate ongoing business development"

The broadness of these descriptions of venture capital finance, which basically refer to all sorts of non-publicly raised equity capital, may cause misunderstanding.[16] A more narrow, precise definition of venture capital may facilitate communication. Therefore I suggest to depart from attempts to define venture capital as all sorts of money provided by presumable venture capitalists, to instead seek to capture the distinguishing, essential features of venture capital.

Since venture capital finance is usually most closely associated with the USA (Wrede 1987), home to more than 700 professional venture capital firms, with over 300 in the Silicon Valley

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[14] Pfirrmann, Wupperfeld and Lerner (1997, p. 9)

[15] Liles (1974, p. 461) also points out, that "[i]nterestingly enough, seed capital situations are considered by some individuals or firms as too risky to be described as suitable for venture capital and by others as the only form of "pure" venture capital investment opportunity."

[16] See also 2.1.2 *Private equity distinguished*

area alone (Price Waterhouse 1998), the definition of the US American NVCA National Venture Capital Association may be considered to possess some authority (NVCA 1998, http://www.nvca.com/def.html, 02.08.1998):

> "Venture capital is money provided by professionals who invest alongside management in young, rapidly growing companies that have the potential to develop into significant economic contributors."

It should be noticed that this definition requires the professional intermediation of funds and thus refers only to the organized or institutional part of the venture capital market. Since the NVCA represents the professional venture capital firms of the USA, it is understood, that it has an incentive to claim the concept of venture capital all for its members.

It has to be kept in mind however, that there is also an informal market for funds given to start-up companies by private investors. Rumors say that some professional venture capitalists refer to these as "dumb dentists". However as private investors or "business angels", as they are often called, may frequently have been business owners themselves, possessing management experience, industry expertise and access to a powerful private network, they might also be in a position to cover key features of the venture capital finance technology (see 4.2.1) to some extent.[17] Therefore venture capital should not be defined investor bound.

MacMillan, Kulow and Khoylian (1988) describe the observable involvement of venture capitalists on a pragmatic level as reaching from nearly total hands-off, in particular during the growth phases of a business to every day active operative management support in particular during the seed and start-up stages of a company. Also the OECD points out that the "'hands-on' aspect of venture capital is a particularly characteristic of investments in early-development-stage companies".

I would like to stress the aspect of management support provided with equity funds as the distinctive feature of venture capital. If venture capitalists would provide purely passive equity capital on a regular basis, they would be indistinguishable from other financial intermediaries.[18] I suggest however to slack the often heard narrowing requirement, that only equity finance plus management support provided to young companies should be considered venture capital.

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[17] The importance of private investors in particular during the early stages of a newly started businesses will be discussed under *3.1 Informal Investors*.

[18] For further arguments emphasizing the importance of the hands-on aspect of venture capital, e. g. added value, monitoring and reduction of uncertainty supported by the prinicpal-agent- theory see *4.2.1 Venture Capital as a Finance Technology* and Appendix III.

Explaining how the conceptual content of the term venture capital changed with time S. E. Pratt (1985, p. 7) points out, that whereas the traditional understanding of venture capital refered to the provision of seed, start-up and first stage financing, venture capitalists broadened their activities to include the funding of the expansion of established businesses, which lack direct access to the public securities market or "credit-oriented institutional funding sources such as banks or insurance companies ... They also provide management/leveraged buyout financing to assist operating management's purchase and revitalize a division of a major corporation or an absentee-owned private company."

In addition, the US National Venture Capital Association (1998) acknowledges, that

> "[n]ot all venture capitalists invest in 'start-ups' ... venture capitalists will also invest in companies at various stages of the business life cycle. A venture capitalist may invest in a company before there is a real product or company organized so called 'seed investing', or may provide capital to start up a company in its first or second stages of development known as 'early stage investing'. Also, the venture capitalist may provide needed financing to help a company grow beyond critical mass to become more successful ('expansion stage financing'). ... At the other end of the spectrum, some venture funds specialize in the acquisition, turnaround or recapitalization of public and private companies that represent a favorable investment opportunity." NVCA (1998)

Therefore venture capital may not necessarily be associated with a certain stage of the business life cycle.

This is however not to say, that the stage model of venture capital, which is introduced below should be abandoned. It is useful to distinguish the changing finance needs and venture capital requirements of a business. I simply argue that the provision of venture capital is not limited to certain stages.

Also established businesses may face special situations such as a management/leveraged buy-out/buy-in MBO/MBI/LBO/LBI or turnaround situations after undergoing crisis, which may require the infusion of equity funds for recapitalization from an active investor (Crawford 1987).

There may, as with Gulfstream Aerospace Corp. (Appendix I), be special situations in the life of an established company, where equity infusion plus management support becomes necessary again. Thus venture capital cannot be defined stage bound.

With a different emphasize Reinhard. H. Schmidt (1985, p. 421) defines venture capital as a possible solution for the finance problem of young, risky and in particular technologically

innovative businesses. Schmidt (p. 431) identifies three characteristic features of venture capital as associated with the US American practice:

- "real" equity capital with unlimited risk exposure and opportunity participation
- the investor assumes an active role in the management of the company
- investors divest by taking the company public and selling their shares in an organized market.

In Schmidt's definition exiting the investment through an initial public offering is considered a typical feature. As will be pointed out in *2.2.2 Divestments and Holding Periods*, in discussing exit opportunities for venture capital investors, company shares are not always sold through IPOs. In fact, public sales account for a smaller share of venture capital divestments and therefore may not be considered a distinctive feature.[19]

Thus I suggest to define venture capital as active investment from a source outside the members of the owner-managers team, distinguished by involving the provision of some sort of equity capital alongside with hands-on management support from an active investor.

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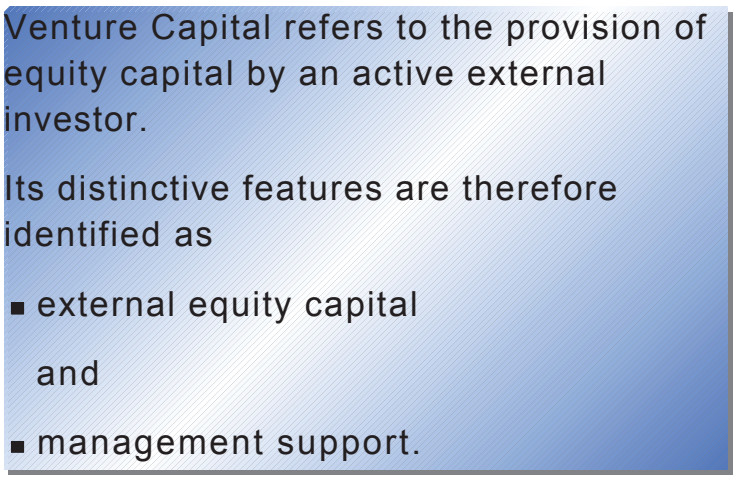
[19] Schmidt explicitly emphasizes the divestment by going public to contrast it as the US-American finance practice against the „traditional" German practice of the Kapitalbeteiligunggesellschaften KBGs.

Schmidt (1985, p. 431) points out that the German funding practice of the KBGs differs from US-style venture capital in that 1) profit participation of the KBG is limited, so that compensation for high risk is impaired, 2) the KBGs take a passive approach to investing, which does neither allow for close control of management, nor for provision of value adding management support, 3) repurchase options granted to the portfolio companies may cause liquidity problems for the investee, trigger conflict about the valuation of shares and lead to adverse selection in the KBGs portfolio, since successful companies will leave while under-performers remain.

see also 4.2.1 and Appendix III



Box 2.1.1 Definition of Venture Capital (Source: Holger Ludewig)

Some may find it necessary to explicitly refer to the long-term orientation or high-risk- high-yield potential of venture capital.[20]

However, the intention for longer holding periods may be considered as typically implied by the provision of equity capital already. Moreover if it would be just for the long-term orientation, long-term debt capital could be sufficient to cover the typical venture capital investment period of 5 to 12 years (Yago 1991).

Regarding the requirement of high-risk/high-yield, it may also be considered an implicit element of the active management feature. The owner of a business would not accept the intervention of an active investor, if it was not for the high risk nature and value additivity of the external investor's involvement.[21]

If the nature of the business and capital requirements would allow it, entrepreneurs would rather choose to stay single in the "driver's seat", without having to share earnings symmetrically. Thus most initiators of a business use their own money complemented by debt to finance their start-ups (Bhide 1992, also 3.3).

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[20] The OECD (1996, p. 15) defines venture capital as "a financing technique .. in the form of equity or an instrument, which can be converted into equity. The essence of venture capital is the provision of high-risk and high-reward finance to fast growing businesses."

[21] *4.2.1 Venture Capital as an Institution* and Appendix III

External equity is the most expensive form of financing. The advantage it offers is, that its ultimate costs are contingent upon the success of the business. Thus as opposed to a debt investor, an equity investor shares the risk of the business.[22]
Because of its costs, equity will only be taken on if self-financing is not possible and business projects are too risky to be financed with debt capital.[23] Passive investors will be preferred to active investors unless the later are expected to add value to the business as a whole by adding skills or strategic assets, or to allow for the ultimate reduction of capital costs, i. e. the required risk premium by eliminating uncertainty.

Active investing causes high transaction costs, which eat into the net return of the investors. From a financial perspective investors will only have an incentive to get "hands-on", if they expect their active involvement to add value in that risks are reduced or higher returns become attainable. Therefore active external investment will always be associated with relatively high risk/high yield investments, whereas for lower risk investments passive provision of capital will do the job. With lower risk investments expected returns in a competitive market would not even be high enough to pay for the afforded "hands-on" support (e. g. Grossman and Stiglitz 1976 and 1980).

With professional venture capitalists it might still be relatively easy to distinguish an active external investor from the original management team seeking support. In general however the venture capital investor may be distinguished from the owner-manager team, who's members are obviously also equity holders, in that he typically intents to provide capital and management services only for a limited period of time and strives to divest from the business as soon as possible (see *3.2.1.2.2 Specialized Added Value Intermediaries: Venture Capitalists,* see also Hamel and Prahalad 1989).
It should be noticed so that the difference between active external investor and active internal investor, i. e. owner-manager may not always be that clearly cut. Difficulties might become apparent by looking at cases, where the venture capitalist is forced to replace the initial founders team by outside managers or venture capitalists, who move as far up-stream in the

[22] It has to be noticed so, that debt and equity mark only two extreme points on a continuum of funding forms, with mixed structures, such as subordinated debt or preferred stock in between (Ewert 1993).

[23] This assumption builds on Myers' (1984) *pecking order theory* of the capital structure.
"Firms are said to prefer retained earnings (available liquid assets) as their main source of funds for investment. Next in order of preference is debt, and last comes external equity financing." Copeland and Weston (1988, p. 507)

see also Stiglitz and Weiss (1981), *4.2.1 Venture Capital as an Institution* and Appendix III

deal-flow, as to initiate the set up of a business themselves by hiring a brain to think about a new product, find someone to develop it and than assemble the management team to usher it into the market (Himelstein, Burrows, Reinhard 1997).

In a paper that looks at the changing landscape of venture capital finance in Germany it seems reasonable to discuss the German language definition of *Wagniskapital, Chancenkapital* and *Risikokapital*. They are all used and often misunderstood as alternative terms for venture capital. But how would the German translations of venture capital be precise, if as was pointed out not even a common English definition exist.

From my point of view, venture capital was most successfully applied and as a term is associated with the USA. It is rooted in the market-oriented finance system of the USA (Allen and Gale 1994), thus I believe it is appropriate to keep using the English term instead of trying to translate it and cause evenmore confusion. An own German term offers too much of an invitation to find more similarities of venture capital with traditional German finance technologies than actually exist (Schmidt 1985).

2.1.2 Private Equity distinguished

Zemke (1998, p. 212 - 215) points out that venture capital was originally used as a generic term including early and later stage funding, characterized by the key features of long-term nevertheless limited provision of equity capital or equity surrogates accompanied by active management support. With time venture capital was frequently understood more narrowly as referring just to the funding of the early stages of a business, Zemke says. He suggests to use private equity[24] as a new generic term as opposed to public equity raised in an IPO.[25]

On the other hand Frommann (1992) explicitly states that the term venture capital first refered to the risky provision of equity funds to start-ups and young technology-oriented businesses. Whereas today the venture capital concept is sometimes understood more broadly to include

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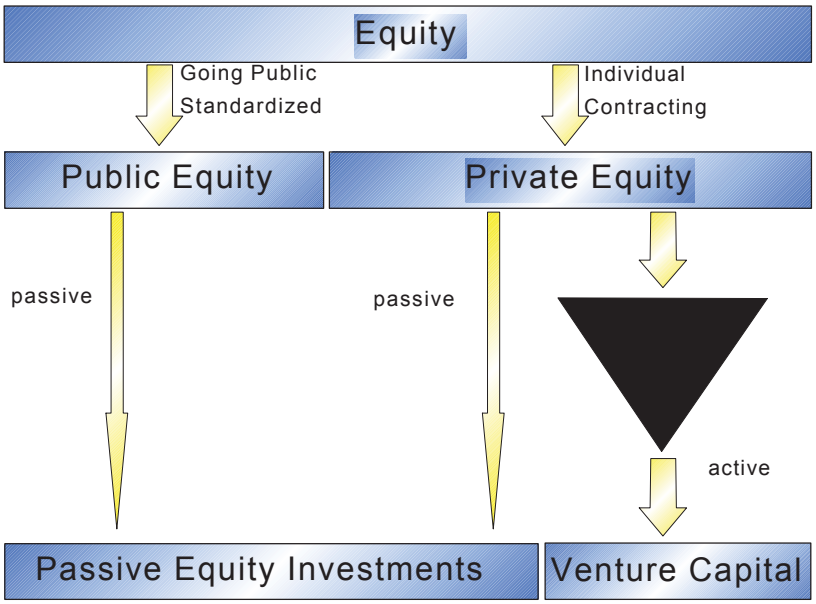
[24] "...private in the sense that it is not raised from the general public, or listed at a recognized stock exchange." Hindle (1997, p. 150)

[25] This point of view is also supported in the article "Time to stop calling it 'venture capital'" by Anslow (1992, p. 2 f.).

The NVCA (1998) reports that "[r]ecently, some investors have been referring to venture investing and buyout investing as 'private equity investing'." The association fears that the term "private equity" may cause confusion, since the term is used in the investment industry to refer to buyout fund investing.

the equity funding of established small and medium sized enterprises SMEs. Thus in everyday use the focus on 'venture' had to step back, Frommann says.[26]



Graph 2.1.2: Private Equity and Venture Capital (Source: Holger Ludewig)

From the statements above it may not be told whether venture capital was first used as a specific or a generic term. I will not attempt to find out whether the venture capital term acutally went from broad to narrow (Zemke) or narrow to broad (Frommann).

In focusing on the nature of venture capital investments, using my definition above, the situation may be resolved. In refraining from the stage -, investor -, exit mode -, etc. - bound definitions, narrowing venture capital down to investments involving the provision of equity funds plus management support, private equity may be used as a generic term for all kinds of non-publicly offered equity investments. Venture capital would therefore be a subset of private equity.

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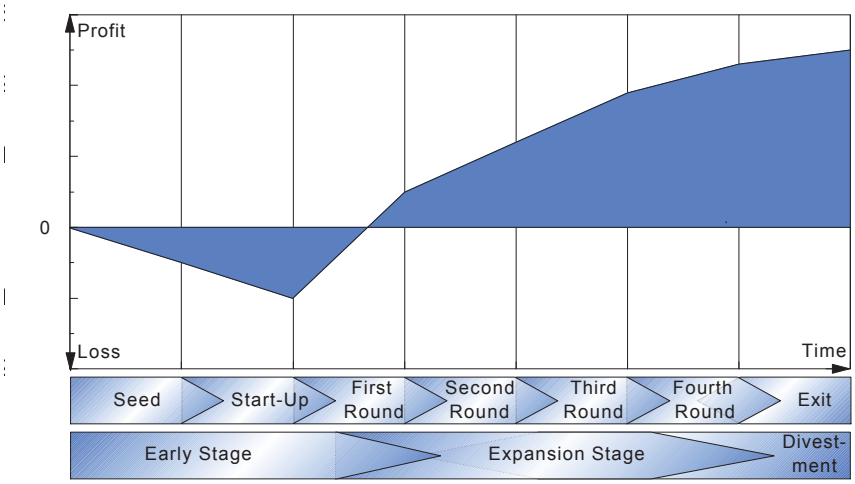
[26] See also Pratt (1985, p. 7) as cite *2.1.1 What is Venture Capital?*

2.2 Early Stage Investments and other Venture Capital Investments

2.2.1 The Life-Cycle-Model: Early and other Stages of Venture Capital Finance

The varying funding needs of young firms addressed by venture capital finance are often presented in association with the stages of the product- or company-life-cyle.[27] Product-life-cycle and company-life-cycle may be regarded as being the same, in cases where a company offers just one product, as will usually be the case with young technology based businesses. The company-life-cyle may be detached from the single product-life-cycle and perpetuated by adding further products and therefore product-life-cycles.

The following stages are distinguished (e. g. Bruno and Tyebjee 1985, OECD 1996, BVK 1998, Pfirrmann, Wupperfeld and Lerner 1997, Posner 1996, Pichotta 1990, Breuel 1988, Nathusius 1985, Lorenz 1985).



Graph 2.2.1 a: Business-Life-Cycle and Investment Stages

(Source: Holger Ludewig)[28]

[27] With regard to the practical use of the model, the Bundesverband Deutscher Kapitalbeteiligungsgesellschaften German Venture Capital Association e. V. (BVK) (http://www.bvk-ev.de) provides its annual statistics on the investments of its member companies distinguishing seed-, start-up-, expansion stage-, MBO/MBI -, turnaround and other projects. A similar pattern is used by the NVCA of the USA, as well as in the national venture capital survey of Price Waterhouse for the USA (http://www.pw.com/vc/) and the annual statistics of the European Venture Capital Association EVCA (http://www.evca.com and press release of May 28th, 1998).
In as far as leading venture capitalist like Draper Fisher Jurvetson (http://www.drapervc.com) and KPCB Kleiner Perkins Caufield Byers (http://www.kpcb.com) use the structure to describe their activities and invite business plan applications, the venture capital scheme structured in association with the stages of the business-life-cylce may be regarded as broadly accepted in practice.

[28] Product-Life-Cycle idea found in various sources e. g. Schween (1996, p. 95), Information content:

A. Early stage investments

The early stage of the business-life-cycle spans from the development of a prototype, to the start of the company to the set up of production facilities and distribution system. Early stage investments fund the first three stages of the company-life-cycle: Seed, start-up and first stage.

Posner (1996, p. 10 f.) notes that there are no really clear cut boundaries to distinguish the single stages, he suggests however, to consider investments in a venture before the actual formation of the business as seed investments and funds provided during the period from company formation to market introduction of the product as start-up investments.

I. Seed-money stage.

The seed-money-stage parallels the founding phase of the company preceding the formal foundation of the company. During this phase relatively little capital is needed to cover first research and development expenses to create the prototype of a product or prove the concept of a business in market research (Schween 1996, p. 98 f.).

This period lasts usually less than one year (Kelly 1989). The seed stage offers the highest positive (chance) and negative risk for the investor (Nathusius 1985). At this stage, Schween (1996, p. 98) says, public support programs in the form of loans, equity capital or publicly supported technology centers are of some importance (Cox 1986, also 3.2.3).

Seed-stage investments are characterized by very high assessment costs and high management support intensity, coupled with low absolute capital requirements. Thus the relative transaction costs are substantial. The gap between gross and net return for the investor would therefore be particularly wide. In addition, longer time span till divestment greatly increases the uncertainty involved with the assessment of product market chances and capability of the management as compared to later stage investments.[29]

II. Start-up stage.

The start-up phase may take six months to five years. Capital is needed to cover the set up costs of the enterprise and initial marketing. At this stage companies may be in the process of being organized or have been in business for a short time, but have not sold their products

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Posner (1996), Bruno and Tyebjee (1985), NVCA (1998), OECD (1996)

[29] Schween 1996, p. 98, see also *2.3 The New Technology Based Firm*, *4.2.1 Venture Capital as a Finance Technology* and Appendix III