FINAL REPORT

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RICAFE

"RISK CAPITAL AND THE FINANCING OF EUROPEAN INNOVATIVE FIRMS"

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1) EXECUTIVE SUMMARY

The main objective of the RICAFE project was to develop an advanced understanding and a comprehensive response to the questions of how the availability of risk capital contributes to the innovativeness of European firms and how current developments in the European models of provision of risk capital affect economic growth and shape policy options and priorities. The guiding principle of our work has been to provide an in-depth empirical and conceptual assessment of the working of the markets for risk capital in Europe which may serve as informed and well-grounded blueprint for the ongoing implementation of effective policies to foster the growth of innovative, entrepreneurial firms and therefore to increase EU-wide innovative capacity. To this effect, the project is divided into three themes. The results and policy conclusions are summarized below.

Theme 1: The ability of the European financial systems to channel risk capital for innovation to entrepreneurial firms

The objective of work under Theme (1) was to provide a detailed analysis of the ability of the European financial system to allocate risk capital to innovative firms. The research reviewed the theoretical and empirical accounts of European venture capital and offered a comparative analysis involving venture capital characteristics in other economies. We consider this an important step towards more informed policy-making because research on venture capital markets outside the United States is still underdeveloped. As an example, little is known about what elements and initiatives can help create active venture capital markets and, consequently, promote innovation in entrepreneurial firms. Our research under Theme 1 has been devoted to fill this and other related gaps.

The first issue examined under Theme 1, is **'the structure of the financing of European innovative firms**'. Our work in this area provides an empirical and comparative assessment of the structure of risk capital financing in Europe. The comparative analysis involves a set of geographically diverse countries, representative of the EU as a whole, in terms of the structure of innovative investments by established firms and by high-tech start-ups. The results show that the venture capital industry is most developed in the UK mainly due to the favorable legal and regulatory framework and lower taxation rates, when compared to other European countries.

The second issue examined under this theme is **'the determinants of venture capital and other forms of risk capital targeted at innovative firms'**. In this part of the project we analyze the main factors affecting venture capital performance and we identify the differences both across European countries and in comparison to the U.S. The analysis takes three different directions. Firstly we study the effect of public policy on capital gains taxation, the existence of profitable exit markets for venture investments, and the level of entrepreneurial opportunities. The evidence suggests that venture capital can profit from lower tax rates and the creation of liquid exit options for venture capital obtained by the opening of high-growth stock markets. Secondly, we focus on the impact of 'optimal' (incentive compatible) financial instruments and of legal regulations on the development of venture capital markets. The main policy implication is that more stringent accounting standards is in the interest of institutional investors, venture capitalists and the economy as a whole. Thirdly, we look at the funding of venture industry and the impact of contractual relations between venture funds and institutional investors in Europe and the US; the

analysis shows that the performance of venture capital can be improved when investors have both the skills and the incentives to act as active monitors and not only as passive capital providers.

The third part of the research under theme 1, provides **'an assessment of European venture capital',** which elaborates on the above analyses and offers the first quantitative comprehensive assessment of the European venture capital industry. The European venture capital is more heterogeneous and less institutionalized than the US market and thus consists of a great variety of venture capital firms, which differ in terms of organizational structures and human capital characteristics. An important contribution at this stage of the research entails the analysis of a hand-collected dataset of European venture capital investments in order to determine which types of European investors also play an active role in the companies they finance. The main findings suggest that active investment styles, providing monitoring to the financed company are strongly related to the specialization of the financial intermediaries and the level of their human capital. Fiscal policy, aimed at improving innovative firms' financing situation, shall therefore target first the financial intermediaries specialising in venture capital and encourage the accumulation of human capital by venture partners. Our research also analyzes in-depth the contractual relations between European venture capital funds and investors. A key contribution at this level is a study on the impact of laws and institutions on venture capital governance structures in Europe and around the world, which suggests that better legal protection and effective legal enforcement facilitate faster deal screening and origination for innovative firms, and provide a fruitful environment for the more active engagement of venture capital in the companies it supports. These findings highlight the importance of properly designed legal and regulatory frameworks for successful innovation financing.

The last part of the research under Theme 1, focus on the interrelation between **'innovation, business creation and the stock market',** particularly for innovative, high-growth companies. A first finding is that the underpricing of IPOs appears to limit the ability of a company to raise funds in the financial market. As this phenomenon seems to be negatively related to the liquidity of the secondary market, innovative firms would benefit from public policies aimed at improving liquidity in the secondary market. Fostering competition among venture capitalists would similarly reduce the costs of raising funds via stock markets. The analysis also compares the effects of different types of VCs on the success of innovative firms after an IPO. The results confirm the notion that particularly private, independent VCs add significant value to their portfolio firms. Finally, we examine the role of financial analysts in helping to improve the access levels of innovative firms to private equity. The policy implications of this part of the project are that financial analysts cannot play successfully their role as information providers unless they operate separately from underwriting companies.

Policy conclusions of Theme 1

- *The quality of investor protection is a crucial determinant in explaining the development of risk capital markets across countries. This becomes especially evident through the UK experience.*

- *Corporate governance rules act as a prime facilitator to entice venture capitalists to adopt a role as active advisors and monitors, besides providing risk capital. There is*

therefore a need for promoting effective standards and transparent regulation of governance standards.

- *There is a need to tighten accounting standards and disclosure requirements, especially on information-sensitive areas like the R&D accounting and other intangibles and accruals.*

- *While it's important to establish stock markets for listing of start-up companies, this is by itself not sufficient. Public policy should also create conditions for listings to be successful in the long run, for instance by imposing tight standards on IPO mechanisms and separation of security analysts from underwriting activities.*

- *Public subsidies for venture capital or R&D expenditures do not necessarily have a positive impact on the success of innovative activities. On the other hand, reductions in capital gains taxes are likely to lead to significant increases of venture investment and R&D spending.*

Theme 2: The influence of risk capital on firms' ability to translate scientific and technological advances into successful products

The main objective of research under Theme 2 is to provide an understanding of the mode of operation of the venture capital industry and its impact on innovation and successful firm development. As venture capital funds are the main source of financing for innovative projects, the effectiveness with which venture capital firms are able to channel funds into financing innovative projects will have an important impact on the creation of successful companies and hence on the rate of innovation of an economy. The analyses under this Theme provide both empirical and theoretical perspectives of the following aspects of the mode of operation of the venture capital industry: the exit decision of venture firms and their impact on the financing of their portfolio companies; the impact of contractual and non-contractual characteristics of venture capital on firms' innovation decision; an evaluation of the ability of public support to encourage the growth of the risk capital market; and the link between the modality of financing and the protection of intellectual property rights.

The first question examined under Theme 2 is the **'sources of finance and the choice of innovation activities in entrepreneurial firms'.** We studied how innovation financing influences the strategic decisions of entrepreneurial firms. The issues addressed include: the relationship between the type of venture capital firms and the amount of innovation undertaken by portfolio companies; the links between financing and corporate governance in both large and innovative firms; the ways in which non-contractual means can be used to reduce agency costs; and, the impact of the venture capitalist exit decision on innovative behavior. To these questions we provide both theoretical and empirical insights. The evidence suggest that corporate behavior is greatly affected by the existence of active investors, and that venture capitalists can greatly improve the efficiency by which funds are made available to innovative firms. This can be achieved by using contractual conditions which ensure that optimal exit decisions are taken, both with respect to returns for investors and – importantly – to the incentives of entrepreneurs to engage in innovative activities. It is also shown that the initial creation (out of entrepreneurial innovative activity) and the further development stages of a business depend on different contractual and governance structures.

Professional investors can take these aspects into account when devising financing contracts. Further reinforcing the results of research under Theme 1, it is shown that better legal protection enhances investors' abilities to exercise governance and support entrepreneurial firms. Additionally, the analysis highlights the role of exit opportunities for investors as these influence contractual structures at all financing stages. As a direct policy implication, more flexibility of the regulation of lock-up periods on high-growth stock markets enhances financing efficiency by allowing investors to build a reputation for quality of their portfolio firms at IPOs. Overall, we unveil new links between the development of financial markets and the potential successful development of entrepreneurial firms.

We then turned to an analysis of "public incentives for venture capital and their effect on the development of commercially useful innovations," where we empirically and theoretically analyze whether and how public provision of venture capital can play a role in encouraging the development of the local venture capital industry. Given the difficulty of young innovative firms in obtaining finance through traditional means, there is a need for some form of public support – however, the form this support should take is in principle less than clear. The analysis contains an empirical assessment on the different types of public incentives for the support of innovative firms. A cross-country comparison of the different European experiences gives further insights on the critical elements in public programs that favor the development of the risk capital market and private investments. These elements include: the availability of professional and independent fund management operating on a commercial basis; the existence of management incentive schemes linking remuneration to fund performance; the design of clear investment guidelines to target investment to the area being helped and concentration on companies who would not otherwise obtain finance; establishing linkage with local communities in order to encourage entrepreneurship as a regeneration and social inclusion catalyst. In a theoretical analysis it is additionally shown that some public policy programs observable in Europe may not satisfy their purpose: given the complexity of contractual structures in the financing of entrepreneurial firms, public policy has to take into account its effects on these structures. Failure to do so results in a general reduction in welfare. Guarantee programs and ex ante grants are identified as doubtful policy measures, while public private partnerships are potentially beneficial measures. Grants conditional on actual performance (in the form of tax breaks) are found to be the most robust and therefore the most suitable instrument.

The third topic of Theme 2 was 'financing, contracting, intellectual property rights and firms' innovative strategies,' which provides theoretical analyses on the relationship between financing, contracting, intellectual property rights and firms' innovative strategies, and thus on the crucial contractual aspects of venture capital with respect to the innovative strategies of firms. One of the questions addressed in this part of the project is how market characteristics like competition, expected profitability, entry costs and capital market transparency affect the way venture capital operates in terms of their financing strategy and contractual relationships with their portfolio firms. Policy measures affecting the supply of capital or competitiveness of the venture capital market are shown to improve welfare. The results point out that the supply of new (public) funds may have negative effects on innovation and the successful creation of entrepreneurial firms when competition for good projects is high. In these kinds of market situations, R&D incentives appear to be more preferable policy measures. Additionally, increases in market transparency improve the value created in entrepreneurial firms. In a final step, the link between financing for entrepreneurial firms and the protection of intellectual property rights is analyzed. One of the crucial issues here is the financing mode for the defense of patents that affects the ability

of innovative firms to protect their inventions against infringers. While it is shown that patent litigation insurance (PLI) as discussed within the EU can be beneficial, it is shown that a compulsory standard policy on PLI may not be efficient. Instead, providing for competitive insurance markets offering tailor-made PLI solutions would be preferable.

The major policy relevant conclusions of Theme 2 can be summarized as follows:

- Corporate governance policies safeguarding the ability of venture capital firms to exercise control over their portfolio companies are an important way of ensuring that venture firms can achieve an efficient role.
- The ability of intermediaries (such as analysts and investment banks) to reduce informational asymmetries in stock markets is an important determinant of successful exits leading to higher entrepreneurial activities, to an extent even greater than for established companies.
- Public subsidies should be conditional on actual performance; conditional grants in the form of tax breaks offer more efficient support to innovative firms' financing and development than unconditional funding. Also, tax incentives focusing on successful portfolio companies in later stages are preferable, as they do not interfere with the screening effect of efficient contractual structures.
- Intellectual property rights are important for innovation. While patent liability insurance should be encouraged, it is clear that an across-the-board mandatory coverage scheme is not optimal, since the optimal design of the insurance contract (deductible, premium) must take innovations-specific characteristics into account.

Conclusions and Policy implications

The major conclusions and policy recommendations arising from our research are the following:

1) Determinants of successful financing and development of innovative firms. We analyse the factors, which positively affect the success of risk capital investments and the financing of innovative firms. We show the influence of legal structures, taxation, organizational structures and characteristics of financiers on the ability to channel funds to promising new firms and to influence their successful development. We support lower capital gains taxes favor risk capital financing of innovative firms. Tax exemptions provide incentives to financiers to successfully support and develop entrepreneurial projects. In volatile market settings, time-varying corporate and income tax policies may also help stabilize of the flow of funds. Enhancing the comparability of company accounts across markets and lowering the different degrees and forms of regulations in capital markets increases market transparency and raises the value-creation ability of private risk capital financing. Regulators should also tackle how unrealized private equity investments should be accounted for at fund maturity.

2) Contractual structures in innovation financing. We discuss several aspects of the contractual structures and non-contractual instruments used by venture capital investors. We focus on the role of legal structures in affecting the ability of financing contracts to provide incentives to entrepreneurs and venture capitalists. Overall, we find that higher procedural complexities and lower quality of legal enforcement reduce the quality of

risk capital financing. We study also the role of contractual relationships in public policy for entrepreneurial financing.

3) The role of exit opportunities: We address one of the crucial determinants of successful venture financing: the ability of investors to exit their investments. Financiers and entrepreneurs use various contractual structures with a direct effect on the anticipated exit in later stages of their relationship. These structures enable the contracting parties to establish contingent payoff and control structures, which ensure the ongoing preservation of incentives and the provision of efforts. Our analysis calls for policy actions that impose strict standards on IPO processes that reduce the ability of banks and financial analysts to favor certain parties of the transaction. In particular, the allocation of shares in primary offerings should be guided by tight rules and transparent oversight. Additionally, our research calls for an acknowledgement of the different roles played by independent and captive VCs. More flexible regulation would improve the successful floatation of innovative companies on European stock exchanges.

4) The relationship between limited and general partners in VC funds. We discuss the provision of funds by investors to specialized intermediaries (venture capital and private equity funds), which channel capital to innovative firms. We discuss those aspects of governance of funds and agency problems, which are relevant for the successful development of an investor base in the asset class of risk capital investments. Several institutional and regulatory means are identified to foster this development.

5) Financing and the protection of intellectual property rights: The protection of intellectual property via patents is a crucial requirement for innovative activity in the first place. We link corporate innovation and financial instruments with the ability of firms to protect the rents arising from their innovation activities, While patent litigation insurance can help small firms to defend themselves against infringers, mandatory insurance of one kind either leads to excessive litigation or potential under-protection of some firms. The implication for policy-makers is to support the development of competitive insurance markets that will be able to provide efficient insurance contracts tailored to the individual needs and characteristics of innovators.

6) The European market for risk capital in international comparison. We provide an overview of major differences between the European market for risk capital and the US market. Successful financing and development of European innovative firms depends strongly on the functioning of its capital markets. Whereas some policy measures unambiguously improve the value of innovation financing (such as increasing market transparency within markets but also across European markets), other means that affect capital market competition might create new imbalances. In particular, excessive supply of funds may occur due to public provision of funds, lowering of venture funds' entry cost or due to overly favorable tax treatments. Our analysis indicates that venture capital firms in Europe are more dealmakers and less active monitors than their American counterparts; they seem to be still lagging in their capacity to select projects and add value to innovative firms. A set of (complex) contractual structures and solutions to problems of asymmetric information has evolved in the mature US market; these are yet to be fully developed in Europe. Therefore, fostering the professionalization and maturation of European venture capital firms should be a more effective policy than trying to channel more funds into the industry.

7) Regulatory frameworks and conditions favouring risk capital financing. Our analysis covers an extensive set of factors, which our research identified to be highly relevant for successful risk capital financing. In particular, we focus on ccorporate governance rules. Our findings highlight the important role of venture firms as financiers, which allows them to influence the behavior of the firms they invest in. Adequate corporate governance regulation and legal enforcement mechanisms are key for these financiers to fulfill their role. Rules fostering good corporate governance emerge as a mechanism to strengthen the role of venture capital firms in Europe and to improve the attractiveness of this asset class for institutional investors. Such issues seem to have been so far overlooked, and our research put them back among policy relevant ones.

8) Public policy for risk capital: Public policy should foster the maturation of the European venture capital industry by encouraging the creation of independent venture capital firms and of the accumulation of human capital by venture patterns. While the public provision of funds appears to have helped in the development phases of Europe's risk capital market, there is no positive impact detectable any more. On the contrary, ill-designed fund provision can be detrimental as it reduces investors' ability to design appropriate contractual structures. We argue in favour of non-grant support schemes. Venture firms should be helped to recoup their funding after exits, which calls for the creation of active stock markets. The governance of venture firms should lead to incentive-based management compensation also in the public sector.

9) Public policy for entrepreneurial firms: public support can be effective, but it needs to take into proper account the many agency and incentives issues which characterize the financing of innovative firms. Public private partnerships and grants to successfully developed entrepreneurial projects are effective instruments. Key success drivers for future initiatives are: independence of public fund managers from political pressure; co-financing by private funds; clear investment guidelines on targets and policies; and performance-related compensation schemes. We argue that promoting innovation by increasing R&D expenditure will be more effective than stimulating the funding of the venture capital industry. Another way to enhance innovation and the creation of growth firms would be the support of regional innovation clusters.

2) BACKGROUND AND OBJECTIVES OF THE PROJECT

The RICAFE project aimed at developing a comprehensive report on how the availability of risk capital contributes to the innovativeness of European firms and on how current developments in the European models of provision of risk capital affect economic growth and shape policy options and priorities.

We draw our inspiration from the *'Risk Capital: A Key to Job Creation in the European Union'* Communication (1998), from the yearly Reports on its implementation, and from the *Green Paper on Innovation* (1994). Our research provides an in-depth empirical and conceptual assessment of the working of the markets for risk capital in Europe, providing an informed and well-grounded blueprint for the ongoing implementation of effective policies to foster the growth of innovative, entrepreneurial firms and therefore to increase EU-wide innovative capacity.

The *'Risk Capital: A Key to Job Creation in the European Union'* Communication identified policy priorities for EU member states in order to foster economic growth and the creation of employment by making the EU business environment more friendly for innovative, high-growth entrepreneurial start-ups. The Communication pointed to the need to foster equity financing as the most crucial step to help European economies move on the 'virtuous circle' of effective financing, commercially successful innovation, and higher growth which has proved so successful in the United States. The proposed implementation laid out in the Action Plan identified some obstacles to equity finance, which could be removed by policy actions. Such obstacles included: the fragmentation of equity and credit markets, regulatory and legal barriers, excessive and distortive taxation of capital gains, harmonization of venture capital legislation, paucity of high-tech small and medium enterprises (SMEs), and the current state of the European patent system.

We started on the premise that such difficulties are indeed crucial and create an urgent need for appropriate policies. By uncovering new empirical evidence on the state of risk capital in Europe, our report aims at providing a sound basis for informed policy making. The main goal of this project was therefore to develop a comprehensive analysis of the ability of European financial systems in supporting industrial innovation and higher economic growth, and to identify appropriate policy responses.

We argue that the financial dimension and its effects on the geography of innovation are in fact crucial in explaining the "European Paradox," i.e. the fact that while Europe generates advanced scientific and technological knowledge, its industries are less successful than their competitors when translating new scientific and technological advances into successful products, into high-growth companies, and into stable employment.

A major strength of the project has been its ability to provide a rigorous assessment of the link between risk capital financing, innovation, and growth. While several studies existed which focus on one, or two, of these elements, we started off with the goal to offer a deeper understanding of the current changes in the EU by providing an empirical assessment and conceptual explanation of how all these factors interact. We have therefore developed theoretical work, which has provided guidance for the collection of data and helped interpret the results of the empirical analysis. However the project has been mainly empirical in nature, and it produced an original set of evidence integrating financial and innovation data.

The overall contribution provides well-grounded and compelling policy advice, due to the new insights we have gained by analyzing together the three building blocks of our project, i.e. risk capital, innovation, and growth.

We have focused on two main sets of objectives, which were grouped in two main themes:

Theme 1: Analyze in detail the ability of the European financial systems to channel risk capital for innovation to entrepreneurial firms. We have assessed the structure of the financing of European innovative firms, the determinants of the supply of funds for risk capital across European countries, and the effects of the regulations of European institutional investors and equity markets; we have in particular assessed the effectiveness of stock exchange markets for innovative start-ups, whose past experience has been very important in the European context.

The first theme has focused on the ability of the European financial systems to channel risk capital for innovation to entrepreneurial firms. It aimed at providing a comprehensive assessment of the contribution of European risk capital systems to the financing of innovation by entrepreneurial, high-growth firms also in comparison to the U.S. In particular, we have studied the following issues:

- The structure of the flow of risk capital into innovative, high-growth firms, and its differences across European economies;
- The ability of public policy to increase risk capital investment in European countries;
- The role of taxation of entrepreneurial ventures and of corporate restructuring in providing incentives for innovation;
- The legal and regulatory structure relevant for risk capital across Europe, and its effects on the supply of finance for innovative firms;
- The determinants of the success and performance of risk capital, in Europe and the the US;
- The role of experience and human capital in the venture investment process;
- The structure and differences of venture capital contracts across European countries;
- The determinants of the performance of private equity investments;
- The determinants of the liquidity of stock markets for innovative companies, the role of corporate governance across these markets, and the role of stock analysts in the dissemination of information;
- The effects of the creation of stock markets for innovative start-up firms, their effects on the supply of venture funds, and on the rate of innovation in Europe, as well as the effect of the growth of the venture capital industry on Europe's 'new' stock markets.

Theme 2: Analyze in detail how risk capital influences the ability of innovative firms to translate scientific and technological advances into successful products. Here we have studied the links between risk capital and innovation. We have analyzed how finance contributes to the innovation strategy of knowledge-based entrepreneurial start-ups. We have considered the role of public incentives for venture capital, and their effectiveness in spurring the financing of innovative start-ups. A major goal of the project has been to analyze how the contracting characteristics of venture capital affect its ability to provide corporate governance and other support services to portfolio companies. This allows a clearer understanding of Europe's innovative capacity in the 'knowledge-based society,' which ultimately determines Europe's long-run growth potential.

The second theme has focused on how risk capital influences firms' ability to translate scientific and technological advances into successful products. In particular, we have studied the following issues:

- The role of legal systems on venture capital contracting, and optimal contracting structures for venture capital: the role of convertible securities;
- The role of legal systems on venture capital contracting and on the specialization of venture capital firms;
- Effects of different forms of financing for entrepreneurial start-ups on the 'rate of innovation' of entrepreneurial firms, and on Europe's innovative capacity;
- The role of corporate venture capital and of bank-funded venture capital funds in comparison to independent venture capital firms;
- The determinants of venture capitalists' exit decision on its effects on firm performance and innovative strategy;
- The role of contracts in providing public incentives to venture capital firms;
- The effect of contractual characteristics on the ability of venture capital firms to raise funds from institutional investors;
- The structure of venture capital contracts with institutional investors and its effects on the timing of exit decisions from portfolio companies;
- The links between venture capital and the protection of intellectual property rights;

Below we describe in detail our findings on each of these two themes. We first outline the main findings. We then detail our empirical and theoretical findings, and finally we outline their policy implications.

The last part of this Final Report derives a detailed set of policy conclusions that will provide the European Commission with an implementable policy tool (a "blueprint") for enhancing innovation and growth by European ventures. We end with a description of the dissemination activities of the project.

3) SCIENTIFIC DESCRIPTION OF THE PROJECT RESULTS AND METHODOLOGY

Theme 1: The ability of the European financial systems to channel risk capital for innovation to entrepreneurial firms.

A. Summary

Theme 1 aimed at providing a detailed analysis of the ability of the European financial system to allocate risk capital to innovative firms. To this purpose, the research undertaken on this theme focuses on overview and a theoretical and empirical analysis of European venture capital and the comparison with its peers. Venture capital, the form of financial intermediation geared towards the creation and growth of entrepreneurial companies with a high potential for innovation, finances and hatches companies that are at an early stage of development ('start-ups') and that operate in high-tech industries. Yet, research on venture capital markets outside the United States is still relatively recent and sparse. For example, little is known about what elements and initiatives can help create active venture capital markets and consequently promote innovation in entrepreneurial firms. The research on Theme 1 has been devoted to fill these gaps. Our report revolves around four key topics:

1) "The structure of the financing of European innovative firms: An empirical and comparative assessment" provides an analysis of the flow of funds to innovative firms from credit and securities markets, comparing a set of geographically diverse countries, representative of the EU as a whole in terms of the structure of innovative investments by established firms and by high-tech start-ups. The results show that the UK is where the VC industry is most developed. The analysis attributes much of this to the favorable legal and regulatory framework and lower taxation rate in comparison to other European Country, i.e. to policy-relevant parameters.

2) "The determinants of venture capital and other forms of risk capital targeted to innovative firms" identifies the main factors that affect venture capital performance. Here we study the performances venture capital market across European countries and in comparison to the U.S. The problem is developed in three different directions. The first approach studies the effect of public policy that affects capital gains taxation, the existence of profitable exit markets for venture investments, and the level of entrepreneurial opportunities. It finds evidence that venture capital can profit from lower tax rates and the creation of liquid exit options for venture capital obtained by the opening of 'New Markets', i.e. high-growth stock markets. The second approach focuses on the role of incentive compatible financial instruments (convertibles) as well as the impact of the legality index. Its main policy implication is that more stringent accounting standards are in the interest of institutional investors, venture capitalists and the economy as a whole. The third approach studies the impact of contractual relations between venture funds and institutional investors in Europe and the US. The results show how the performance of venture capital can be improved when investors have the skills and the incentives to act as active monitors and not only as passive capital providers.

3) "An assessment of European venture capital" aims at providing the first comprehensive assessment of the European venture capital industry integrating the finding of Work package 1.1. The European venture capital is more heterogeneous and less institutionalized than the

US market, thus harboring a greater variety of venture capital firms that vary in terms of their organizational structures and human capital attributes. This richness helps in the identification of the crucial elements that can explain the difference of venture capital performance in different countries. An important research contribution consists in the analysis of a hand-collected dataset of European venture capital investments in order to determine which types of European investors also play an active role in the companies they finance. The main finding of this contribution is that active investment styles providing monitoring to the financed company are strongly related to the specialization of the financial intermediaries. As active investor improves the performance of the financed firm, fiscal policy aiming to improve innovative firms shall target first the financial intermediaries specialized in venture capital. The research also analyzes in-depth the contractual relations between European venture capital funds and investors. A third contribution is a study the impact of laws and institutions on venture capital governance structures in Europe and around the world. The final research output is the investigation of the market-timing ability of private equity fund managers. Its central result indicates that better legal protection and legal enforcement (measured by a Legality index) facilitate faster deal screening and origination of innovative firms. A cash flow based analysis of private equity performance also shows that the ability to time investments is most relevant when venture capital funds invest into young, innovative firms as opposed to already mature firms.

4) *"Innovation, business creation, and the stock market"* studies on the relation between the growth of venture capital industry and the stock market for innovative companies. Namely the first two papers focus on the underpricing of IPOs. Underpricing reduces the ability of a company no rise funds in the financial market. This phenomenon seems to be negatively related to the liquidity of the secondary market and positive related to the bargaining power of the venture capitalist involved in the IPOs. Innovative firms would probably benefit from public policies aiming to improve liquidity in the secondary market and to increase competition among venture capitalist. A third research paper compares the effect of different types of VCs on the success of innovative firms after an IPO. The results confirm the notion that particularly private, independent VCs do add significant value to their portfolio firms. The fourth paper in the package examines the question whether financial analysts help to improve the access of innovative firms to private equity. The policy implication of this paper is that financial analysts cannot play its role in information provision unless there is a separation of financial analysts from underwriting companies.

The remainder of this discussion is organized as follows. The next session provides a description of the key results of these research papers, by discussing each of the four topics of Theme 1 separately. The discussion is organized around the results of our research papers. Finally, we summarize policy-relevant conclusions that come out of the research.

B. Detailed Report on the Research Findings

The following section presents a review of the research results of the RICAFE project, organized around the four main topics we have addressed. For each topic, we detail the findings of the relevant research papers.

"The structure of the financing of European innovative firms: An empirical and comparative assessment"

The objective of this topic is to provide a broad description of the main issues affecting the European venture capital market, gathering facts, numbers, insights, and hypotheses from available sources and quantitative studies. We have also reconstructed the main flows of funds into risk capital markets, and assessed the size of different national markets. Our results come from two research papers. Arcot and Bruno provide an overview and a map of the knowledge and the research of risk capital funding in the European Union. Swoboda estimates the importance of credit constraints suffered by innovative companies.

1) "*Venture Capital in Europe: Facts and Issues*" by Sridhar Arcot and Valentina Bruno.

The paper characterizes the European VC market in terms of its sources of funding, its investments into different industries and the exit strategies used.

A detailed description is provided for five individual countries viz. UK, France, Germany, Sweden and Italy. UK is where the VC industry is most developed amongst all European nations. In 2001 the amount of funds raised was more than half of all Europe Pension funds are the leading source of funding while banks were second in importance. Consumer related is the main sector of investments in high-tech firms, (which is around 13%). France is the second largest VC market in Europe after UK. Banks have always been the main source of financing. Consumer related and industrial products are the main sectors of investment. The communication sector represents 13% in 2001. Germany represents the third largest VC market in Europe. Banks are the main investors. Large percentages of the investments are in industrial products and services, and investments in high-tech firms are 15%. Together with Italy, Sweden is the fourth largest VC market in Europe. Corporate investors, pension funds and insurance companies are the main source of funding. In contrast to the EU average, Sweden invests largely in sectors such as medical and health and chemicals and materials. In Italy banks are the main source of funding (48% on average in the years 1998-2001) whereas the contribution of pension was largely below the EU average. The industrial products and services and consumer related sectors have progressively decreased in importance in favor of communications.

Second, the effect of venture capital on innovation is studied. The authors explore the effect of VC investment on three different measures of innovation viz. Business Expenditure on Research and Development, Total Patenting Activity and High Tech Patenting Activity. Not surprisingly, the aggregate data indicate that innovation as measured by High Tech Patents filed and VC investments appear to be related. This connection is explored in more detail and depth below when we address the effects of public incentives for venture capital.

Third, the authors analyze the legal and regulatory framework. The authors look at the policy initiatives and regulatory environment in five countries viz. UK, France, Germany, Italy and Sweden. The authors find that the regulatory environment for VC varies widely between different countries. In this context, the authors feel that the experience of UK is the most helpful and there is a lot that can be learned.

Finally, the study describes an important initiative undertaken in various European countries to encourage VC investment, namely the establishment of liquid exit options for the public listing of innovative firms. The authors analyze the performance of major new stock markets of Europe geared to the high-tech sector and compare it with the NASDAQ in the USA. They find that after an initial spurt of activity these markets have not enjoyed the level of success envisaged when they were set-up. These findings lead us to our next topic, where we explore the factors contributing to the maturation of the European risk capital markets and the determinants of their performance.

2) "*Cash Flow-Investment Sensitivities of European Companies in the 1990s*" by Alexander M. Swoboda.

The last paper for this topic looks at financial determinants of corporate investment behavior. In contradiction to the classic theory of finance, liquidity appears to plays a crucial role for investment decisions. The standard explanations for his behavior are: differences in the external and internal cost of capital (costly external finance) and the tendency of management to over-invest in their own interest (empire building). The paper assesses which of the two effects is relevant for different sets of European companies. The paper examines the behavior of various sub samples of firms, which would be expected to behave differently according to the two theories. Costly external finance would predict that companies with financial slack, low leverage or high credit worthiness are less responsive to liquidity shocks. According to the empire-building hypothesis, block holders among a firm's owners should reduce cash flow-investment sensitivities. The analysis thus sheds light on the important link between financing and corporate governance.

Due to the better availability of data, the study uses information from companies listed on European stock exchanges. The data contains the available large cap companies from the leading indices of five European countries: France's CAC 40 Germany's DAX 100, Italy's MIB 30, Spain's IBX 35 and the UK's FTSE 100. In total, this sample contains 234 large caps. In addition 605 growth companies were included which were listed on different European growth markets: Neuer Market in Germany, the UK Tech Market, the Nouveau Marché in France, the Nuovo Mercato in Italy, and the Nuovo Mercado in Spain.

The analysis of the sample compound of European large caps and growth companies from the 1990s finds that both financial slack and leverage on the one hand and ownership concentration on the other hand are relevant for the effect of liquidity on corporate investment. The results hold not only for investment in fixed assets, but in most cases also for investment in other balance and off balance sheet items (i.e. human capital and "burned" cash). Constrained companies from the total sample depend more strongly on cash flow than non-constrained, the latter being strongly driven by future growth opportunities. These findings are largely in line with the literature on costly external finance. In addition to previous findings, it turns out that information asymmetries exist in particular for large companies whereas there were no systematic differences for high-growth companies. In spite of the better analyst coverage and the presumably more efficient capital markets for

large caps, the information barrier between investors and management seems to be higher for larger firms. This may be caused by a closer relationship between management and shareholders of the smaller companies. The data also indicates that growth companies with little cash generally rely on debt capital as their predominant source of finance and not on cash flow when it comes to investment.

With respect to the empire-building hypothesis, block holdings appear to reduce the influence of cash flow and in return increase the influence of future growth opportunities. This confirms previous findings that identify empire-building behavior as an explanation for investment-cash flow sensitivities. Additionally, the analysis is able to show that the over investment in empire building concerns not only fixed assets but also other balance and off balance sheet (i.e. immaterial assets; "burned" cash) items. Small growth companies in addition seem to over invest with respect to intangible fixed and current assets. Overall block shareholders have a positive impact on by reducing cash flow-investment sensitivities.

"The determinants of venture capital and other forms of risk capital targeted to innovative firms"

This topic deals with the determinants of venture capital investment in Europe, the role of the supply of funds and of taxation and legal regulations, and the success of risk capital investments compared to that of US risk capital.

We have produced four research papers for this topic. The paper by Da Rin, Nicodano and Sembenelli evaluates the effects of alternative policies on risk capital markets, providing the first systematic comparison of national experiences over the 1990s. The other three papers (by Cumming and Walz, by Hege, Palomino and Schwienbacher, and by Nowak, Knigge and Schmidt) look at three different aspects of the success of risk capital funds: the role of legal structure and of investor activism, a comparison between the performance of US and European venture funds, and finally the role of investment and divestment timing in fund performance.

1) "*Public Policy and the Creation of Active Venture Capital Markets*" by Marco Da Rin, Giovanna Nicodano and Alessandro Sembenelli.

This paper explores how public policy can contribute to the development of `active' venture capital markets, i.e. markets with a large share of early stage and high-tech investments. The authors proceed in two steps. First, the authors provide a simple theory of the structure of venture capital markets, focusing on the conditions that determine the distribution of financing between early and late stage, and between high-tech and low-tech, investments. The author's model extends the seminal article of Holmstrom and Tirole (1997) by allowing for the possibility of an excess supply of funds. As in the original model, firms are heterogeneous in their ability to pledge collateral against borrowing, but the authors also assume that this ability is higher for firms that possess more tangible assets, which are more easily accepted as collateral than intangible assets. As firms mature from start-ups to later stage ventures, they make larger use of tangible assets. Likewise, firms in high-tech industries make more use of intangible assets than those in traditional industries. This creates a `pecking order' in firms' ability to pledge collateral against loans. The authors define the `innovation ratios' as the ratio of early stage (high-tech) investments to total venture investments, and take venture capital markets to be more active the higher are these

ratios. While simple, the author's theory is rich enough to point to four factors as potential drivers of active venture capital markets. This includes the supply of funds available for investment. But the paper looks also at factors which affect project's expected returns: the level of capital gains taxation, the existence of profitable exit markets for venture investments, and the level of entrepreneurial opportunities.

The paper's second step consists of taking the model's predictions to the data. The authors introduce some variables neglected by previous empirical analyses, and find them to be important drivers of the innovation ratios. The authors also innovate from a methodological viewpoint. The paper's simple theory provides a framework that helps overcoming identification problems.

The hypotheses are tested using a panel of data from all the countries of the European Union, except Luxembourg, for the 14 years between 1988 and 2001. This is the first study to assess the effects of many of the main available policy instruments affecting venture capital markets within a comprehensive, rigorous framework. One dimension is the taxation of capital gains. They find that a reduction in capital gains taxation increases both the high-tech and early stage ratios. Lower tax rates thus increase the relative attractiveness of high-tech and early stage investments, i.e., those resulting in a higher upside. Concerning a second dimension, policies encouraging the creation of `new' (stock) markets, the authors find that the opening of in some countries since the mid 1990s helps explain the evolution of both the early stage and high-tech innovation ratios. The panel setting provides the first rigorous test of the importance of an exit option for venture capital. With respect to a third dimension, public subsidies for venture funding; the data do not provide any evidence of a shortage of venture capital funds for European companies. Nor is there any evidence that public expenditure in research and development (R&D) favors the innovation ratios. The authors however caution that their approach, based on the identification of the innovation ratios, does not rule out a level effect of either the supply of funds or public R&D expenditure.

Building on earlier research in defining its research design, this contribution to the RICAFE project improves from the previous literature. By focusing on active venture capital markets, the authors look at the most relevant segment for economic growth. The model provides us with a compelling framework to guide the empirical analysis. The resulting inclusion of new variables in the analysis makes this the first study to assess the effect of policy on venture capital in a comprehensive framework. The authors' panel approach avoids the endogeneity issues, which made previous attempts less than conclusive, and provides a better methodological grounding for the authors' results.

2) "*Private Equity Returns and Disclosure around the World*" by Douglas Cumming and Uwe Walz.

This paper measures the performance and risk of venture capital in Europe North America and Asia with respect to their exited and unexited investments and relates these performances to the accounting standards and legal framework on the reporting behaviour of VCs. More precisely, the authors study the returns the venture capital and private equity investment from 221 venture capital and private equity funds that are part of 72 venture capital and private equity firms, 5040 entrepreneurial firms (3826 venture capital and 1214 private equity), and spanning 32 years (1971 to 2003) and 39 countries from North and South America, Europe and Asia. The authors make use of four main categories of variables

to proxy for value-added activities and risks that explain venture capital and private equity returns: market and legal environment, VC characteristics, entrepreneurial firm characteristics, and the characteristics and structure of the investment. The global nature of the dataset makes it possible to investigate potentially important aspects of economic and financial set-ups, rules and institutions and their impact on VC returns and reporting behaviour. In particular, due to the availability of cash flow series for each investment of the respective venture capitalist, the authors are able to calculate the profitability of the investment on the basis of the entire cash flow series.

The authors are able to explain a large part (up to 36%) of the total variation in the internal rate of return (IRR) among the different observations. Prior papers accounted for only between 1% and 13% of the variation in returns to U.S. VC investments. The data indicate an importance in accounting for selection effects in realized versus unrealized returns, as well as for full versus partial exits. Most importantly, the authors find that more monitoring, advice and the use of incentive compatible financial instruments (convertibles) contribute to a significant increase of the Errs implied by realized returns. These findings, as well as the positive impact of the legality index are robust across the different modeling specifications.

The main findings are that especially young VCs as well as those being engaged in early stage investments are more eager to over-report. In contrast, syndication is found to lower the incentives of VCs to overstate the value of their unexited investments. More importantly, from the authors' point of view, is the very robust significant impact of accounting standards and legal framework on the reporting behavior of VCs. Less stringent accounting rules and weak legal systems clearly seem to facilitate overvaluation thereby decreasing the informativeness of these valuations.

There are two implications. The first one concerns the implication on policy-making and the behavior of the VC industry as a whole. More stringent accounting standards are in the interest of institutional investors, venture capitalists and the economy as a whole (inducing the provision of more risk capital if the information between investors and VCs is less distorted). The second issue is to what extent the over-reporting strategy is successful with respect to fundraising, and therefore distorts the allocation of capital across VC funds and across countries. The relation between overvaluation and future fundraising is a very important question in the venture capital cycle.

3) "Determinants *of Venture Capital Performance: Europe and the United States*" by Ulrich Hege, Frédéric Palomino and Armin Schwienbacher.

This paper presents a study of contractual determinants of success in venture financing, by comparing the conditions in a mature venture capital market (United States) with those in a relatively new market for venture financing (Europe). Until very recently, most of the past research on venture capital has focused on the United States, and if only for the reason that this industry was hitherto underdeveloped in other parts of the world. The bull market for high-tech firms in the late 1990s has changed this exclusivity, making comparative studies like the present one possible.

The purpose of this study is to analyze drivers of venture capital success on a micro-level basis, by identifying characteristics in the relationship between venture capital firms and portfolio companies (the term universally used for VC-funded start-ups) and investigating empirically how they contribute to the success of the funded projects. Performance is

measured in two different ways: the type of exit and the internal rate of return of the financed project. This second way of measuring performance represents a departure from the existing literature since it takes into account all financing rounds and uses self-reported valuation data.

In order to gather data about the performance of both European and U.S. venture capital markets. The authors have taken a two-pronged approach. On the one hand, the authors have directly contacted a large number of venture capital firms with a questionnaire asking them to provide details of their contractual practice, experience and scope. On the other hand, the authors use the VentureXpert database that provides for a large number of portfolio companies and worldwide details of investments, participants and valuations in every financing round.

The paper's main results are the following: as a starting point, data confirm that there is a significant gap in performance between US venture capital firms and their European counterparts, both in terms of type of exit and of rate of return. The authors find evidence that this gap might be attributable, at least to a degree, to several important differences in the contractual relationship between venture capitalists and entrepreneurial teams, like the frequency and effectiveness of the use of instruments asserting an active role of venture capitalists in the value creation process. To be more precise, the authors identify three such determinants. First, venture capitalists in the United States are much more assertive in reserving contingent control rights: they use more systematically financial instruments that convey residual control in case of poor performance, namely convertible securities, and they activate contingent control more frequently, as measured by the replacement of entrepreneurs and the termination of projects.

Second, it seems that US VCs have sharper screening skills than their European counterparts. This translates into a larger fraction of the total investment invested in the initial round and a higher degree of translating initial investments and funding frequency into success.

Finally, there is some evidence for a more effective management of financing relationship and participation of different groups of investors in the United States. Interestingly, the results suggest that relationship financing, which is more pronounced for European companies, does not have any significant impact on performance there. Overall, the paper's results indicate that venture capital firms in Europe are more dealmakers and less active monitors; they seem to be still lagging in their capacity to select projects and add value to innovative firms.

4) "*On the Performance of Private Equity Investments: Does Market Timing Matter?*" by Eric Nowak, Alexander Knigge and Daniel Schmidt.

This research paper contains the first examination of market timing ability of private equity fund managers. Private equity plays an essential role for financing innovative companies and business sectors in: They do not only constitute an important source of financial funding but also represent a key monitoring device for young growth companies. Surprisingly, little is still known about the performance characteristics of private equity as an asset class. While for mutual funds it is common practice to break down portfolio performance into two components (security selection and market timing), portfolio performance of private equity funds has not been split up into these contributions so far. This paper aims to fill this gap.

The study aims to understand whether private equity funds time the market, and also, whether there is a relationship between positive market timing ability and overall fund performance. With timing ability thereby means the deal-by-deal investment timing ability of individual fund managers within the funds' lifetime. Due to the special characteristics of private equity, market timing ability is separately analyzed for the investment and for the divestment phase. The analysis is based on a unique dataset derived from the records of CEPRES, The Center of Private Equity Research, which is connected to some of the research network's partners. The dataset is extraordinary with respect to the level of detail provided concerning gross cash flows, compensation, investment manager and the sequence of the fund. The dataset contains both venture capital as well as private equity buyout funds.

The results show that investment timing plays an important role for the overall performance of private equity funds. However, due to the illiquidity of the asset class, exact market timing is hard to accomplish. Generally, venture capital funds do better in timing exits than buyout funds. However, for venture capital funds, investment timing matters most. Surprisingly, divestment timing has on average a lower impact on returns, even accounting for the bubble period if 1998-2000. Consequently, the timing of investments, that is to invest in times of favorable market valuations, is essential for investing venture capital into immature companies. For later-staged buyout funds the analysis reveals that fund performance is not driven by market timing but is significantly related to the experience of the individual fund manager. Thus, for successful investing into more mature portfolio companies, getting access to better deal flow and managing the investment affect the resulting success of these investments, rather than market timing.

"An assessment of European venture capital"

This topic provides an evaluation of European risk capital markets, where we focus on the role of institutional specialization, human capital, and on the role of market structure, legal structures in shaping contractual agreements, investment styles, and best practices.

We have produced three research papers for this topic. The paper by Bottazzi, Da Rin and Hellmann provides an empirical analysis of how institutional specialization and the accumulation of human capital result in more active investment styles by venture capital firms. The paper by Schmidt and Wahrenburg examines the role of market structure on the contractual relations between venture capital funds and institutional investors. Cumming, Daniel Schmidt and Uwe Walz assess the role of differences in legal structures on the size, investment style, and success of venture capital funds in Europe, the US and Asia.

1) "*Specializing Financial Intermediation: Evidence from venture capital*" by Laura Bottazzi, Marco Da Rin, Thomas Hellmann.

This paper analyzes a hand-collected dataset of European venture capital investments in order to determine which types of European investors merely allocate funds and which ones also play an active role in the companies they finance. The dataset is concerned with European venture capital investments and covers the period 1998-2001. It consists of a sample of venture capital deals in the 15 EU countries, plus Switzerland and Norway. The primary data source is a comprehensive survey of all venture capital firms in these countries, on which the authors achieved an overall response rate of over 15%. The authors then

augmented the data with numerous secondary sources, including commercial databases and websites. The relevant data for this paper consist of over 120 venture capital firms, over 480 partners, and over 1,500 deals.

A unique strength of the dataset is that it contains a large variety of empirical measures about the activities of venture capitalists. These fall into two main categories. The authors have data on the investment choices of venture capitalists, such as whether they invest in high technology or early stage deal, which are the particularly information-intensive segments of the venture capital market. And the authors obtain a variety of measures about the involvement of venture capitalists with their companies, so that the authors can look at the various dimensions of investor activity.

Another significant strength of the dataset relates to the measurement of specialization at two distinct levels: organizational characteristics, and human capital. The authors have data on two types of organizational variables. First, the authors have measures about organizational identity, such as whether a venture capital firm is independent or not. And second, the authors have measures about strategic specialization, such whether intermediaries invest only in venture capital, and how many deals they do per partner. In terms of human capital, the authors can measure the average profile of a firm's partners. In addition, the authors can even identify which partners are responsible for which deals.

The authors find that active investment styles are strongly related to the specialization of the financial intermediaries. For example, independent venture capital firms are significantly more likely to get involved with their companies, and they are also more likely to invest in information-intensive deals. The same applies to firms that focus their investment activities, such as specializing on doing only venture capital deals. Beyond organizational specialization, the authors find that specialization of human capital is also strongly associated with an active investment style. In particular, the authors find that venture capitalists with prior business experience are significantly more involved with the companies they finance.

2) "*Contractual Relations between European VC–Funds and Investors: The Impact of Reputation and Bargaining Power on Contractual Design*" by Daniel Schmidt and Mark Wahrenburg.

This paper empirically analyzes the contractual relations between European venture capital funds and investors. The aim of the study is to identify the factors that influence the design of financing contracts between venture capital investors and European venture capital funds. The authors focus on those contractual arrangements that are used to regulate the principal agent relationship between investors and fund-management. Contractual key elements are certain covenants, which restrict the venture capitalists from opportunistic behavior, and compensation terms. In respect to compensation, the authors' analysis refers to the management fee, the carried interest and its call option value, the hurdle rate, and the fund managers' obligation to make their own capital contribution.

The analysis is based on a dataset comprising of 122 private placement memoranda and 46 partnership agreements of European VC-funds are used for this study. Data was collected from the archive of one of the oldest and largest VC fund of fund firms in Europe. The authors restricted the analysis to independent private limited partnerships, which engage exclusively in VC investment and are located in a European country.

To expose market reactions in the VC-market, the authors examine the economical effect of two determinants on contractual design: the agents' reputation and bargaining power. The authors develop empirical evidence that the effect of these factors on the design of contracts does not completely correspond to general theoretical approaches. In the VC-business, markets seem to work different.

Regarding the question how VC-markets are working, the authors found empirical evidence showing a substantial impact of the managers' reputation and bargaining power on contractual design. Contrary to theoretical reasoning, reputation seems to aggravate the incentive conflict between investors and managers instead of aligning their interests. This increases the need for higher contractual restrictiveness. Furthermore, the authors found signs of overconfidence. Managers in times with a growing VC-pool seem to prefer higher performance-related compensation and lower fixed payments. They renounce from using their negotiation power to increase guaranteed payments over the whole funds' life. They rely more on own future performance. This does not correspond to the price adjustments that would be expected from rational players.

3) "*Legality and Venture Governance Around the World*" by Douglas Cumming, Daniel Schmidt and Uwe Walz.

This paper provides an explanation to the large differences in the size and success of venture capital markets around the world due to differences in laws and institutions and to their effect on venture capital funds' governance structures.

The study focuses on international differences in governance structures in venture capital in three related and equally important categories: (1) time to deal origination (which reflects screening and due diligence), (2) syndication and co-investment, and (3) board seats and security choice.

The first main pillar of the study is the screening process, that is the Venture capitalist process of selection the deals that should be completed among the many request of financing. In terms of cross-country differences in venture capital finance, where laws impede the due diligence process they slow down the rate of investment and ability of a fund to properly manage deal flow and the financing of meritorious entrepreneurial firms.

The screening and due diligence process is in turn closely connected to syndication and co-investment, or the interaction among different investors within any investment. This is the second main pillar of the analysis. Syndication enhances venture capitalist screening, monitoring and value-added. By contrast, co-investment does not facilitate these governance mechanisms and may reflect an agency problem vis-à-vis the institutional investors if one VC fund is using capital to bail out the bad investments of another VC fund within the same VC organizational structure. This paper extends the literature by exploring the issue of whether successful legal and institutional structures facilitate syndication relations and inhibit co-investment by VCs in a very broad international context.

The paper's third and final pillar invokes an analysis of the interaction between venture capitalists and investors. The authors study cash flow and control rights that focus on the substantive aspect of governance as opposed to the form of governance. In regards to the control rights, the authors investigate the question of whether the venture capitalist has a seat

on the board directors of the entrepreneurial firm. To this end of studying control, the authors are able to add to prior research by studying a broader array of data and countries than that which has previously been possible with prior datasets. In regards to cash flow rights, the authors believe significantly extend prior work by examining whether the financial contract between the VC and entrepreneur involves just upside potential for the investor, or whether or not there is both period cash flows provided to the investor prior to exit, as well as upside potential.

In each of the three main areas of their analysis the authors focus on the Legality index that is a weighted average of the legal index variables introduced by La Porta et al. (1997, 1998). The analysis is based on a very large international dataset of 3828 venture capitalist investments from 39 countries (from North and South America, Europe and Asia) and 32 years (1971-2003).

Overall, the data indicate that Legality plays a crucial role in venture capitalist governance structures that facilitate the financing of high-tech entrepreneurial ventures, and the success of a country's venture capital market.

More precisely, the first central result indicates that better laws facilitate faster deal screening and origination. The authors find that an increase in the Legality index from 20 to 21 (a typical improvement among developed nations) lowers the time until lead first investment by approximately 16%, whereas an increase from 10 to 11 (a typical improvement among emerging markets) lowers the time until lead first investment by approximately 33%.

Second, the authors show that better laws lead to a higher probability of syndication and a lower probability of potentially harmful co-investment. In particular, an increase in Legality from 20 to 21 increases the probability of syndication by approximately 3.0%, whereas an increase from 10 to 11 increases the probability of syndication by approximately 5.8%. Similarly, an increase in Legality from 20 to 21 reduces the probability of co-investment by approximately 1.9%, whereas an increase from 10 to 11 reduces the probability of co-investment by approximately 3.7%.

Third, the authors show that better laws also facilitate board representation of the investor and reduce the probability that the investor requires periodic cash flows. In particular, an increase in Legality from 20 to 21 increases the probability of board seats by approximately 4.3%, whereas an increase from 10 to 11 increases the probability of board seats by approximately 8.4%. Similarly, an increase in Legality from 20 to 21 reduces the probability of periodic cash flows by approximately 1.9%, whereas an increase from 10 to 11 reduces the probability of periodic cash flows by approximately 3.8%.

"Innovation, business creation, and the stock market"

This topic focuses on what can help create liquid stock markets for entrepreneurial companies, and on what are the effects of these markets on risk capital.

We have produced four research papers for this topic. The paper by Ellul and Pagano documents how uncertainty on the future returns on stock issued by entrepreneurial firms is an important source of underpricing, and therefore of loss of potential funds which firms

could raise at the IPO but are instead lost due to market imperfections. Franzke, Tykvova and Walz, look at the role of venture capital in bringing entrepreneurial firms public, thus exploring a further link between stock markets, risk capital, and innovation. Finally, Degeorge, Derrien and Womack ask whether financial analysts help to improve the access of innovative firms to equity markets.

1) "*IPO underpricing and after-market liquidity*" by Andrew Ellul and Marco Pagano.

Since underpricing implies a higher cost of capital for the issuing company, a better understanding of the reasons for underpricing can help to suggest better design of institutions to reduce underpricing and hence a lower cost of capital for companies. In the first research paper, the authors greatly advance the state of literature on underpricing. Traditional explanations of underpricing in Initial Public Offerings (IPOs) rely on asymmetric information and risk. However it is a well-documented fact that returns of seasoned securities include a liquidity premium. One would therefore expect such a premium to be paid by stocks in the process of being floated. The authors develop a new theory linking underpricing to after market liquidity and liquidity risk. They show that an IPO that is expected to be less liquid and to have higher liquidity risk should feature higher underpricing. This is because if IPO investors anticipate that they may have to resell the stock in the immediate aftermarket due to liquidity needs, they will require compensation for the expected trading cost that they will incur as well as for the associated risk of an illiquid secondary market.

To test for the presence of liquidity effects on IPO underpricing, data are collected from a variety of sources. The authors analyze all the IPOs undertaken on the London Stock Exchange (LSE) from June 1998 to December 2000. From this sample they eliminate closed-end funds, open-end funds and investment companies which leaves them with 337 IPOs, of which 37 went public in 1998, 121 in 1999 and 179 in 2000. For each company, two types of data are collected: (i) tick-by-tick transaction and quote data provided by the LSE, and (ii) company-level data, drawn from IPO prospectuses filed with the Financial Services Authority (FSA), the UK Listing Authority. The LSE data include for each company: (a) date and time of each trade executed in the after-market, (b) quantity transacted in each trade, (c) transaction price, and (d) trade direction (buyer- or seller-originated), from inception of trading up to the end of 2000. The FSA data concern the terms of the IPO (offer price, IPO mechanism, number of shares issued in the IPO, stabilization agreement with the underwriter, etc.), firm characteristics (age, sector, sales, assets, leverage, presence of venture capitalists), and ownership and control (shares sold by the initial shareholder, percentage of shares held by private investors after the IPO, changes in stock options held by insiders, etc.). When the prospectus was not available from the FSA, these data are drawn from Worldscope. The companies in the sample list either on the Main Market (MM) or on the Alternative Investment Market (AIM) of the LSE, depending on their accounting records.

The authors use after-market's effective spread as the main measure of liquidity and the variability of the effective spread to measure liquidity risk. The main empirical challenge is to estimate the market's expectation of after-market liquidity and of its variability, conditioning on the information known at the time to the IPO. The authors use various methodologies to tackle the issue. Consistent with their hypotheses, they found that expected after-market liquidity and liquidity risk are important determinants of IPO underpricing, even after controlling for other variables suggested by other theories of IPOs (e.g. variables

capturing asymmetric information and fundamental risk). Their results are also robust to the use of alternative econometric methodologies. Their results are novel for two reasons. First, they highlight an important and neglected link between market microstructure and corporate finance: secondary market liquidity affects the cost of equity capital for companies that choose to go public, and may even affect that very choice. Second, they document that investors price not only the expected level of liquidity but also liquidity risk – and that the latter possibly matters to investors even more than liquidity itself.

2) "*Underpricing of Venture-Backed and Non Venture-Backed IPOs: Germany's Neuer Markt*" by Stefanie A. Franzke.

This paper provides an analysis of the pricing of the stock of listing companies on the 'Neuer Markt'. The objective is to analyse the role of venture capital firms during IPOs. In addition, this study seeks to determine whether venture capitalists backed IPOs are less under priced compared to non-VC backed IPOs. This knowledge will help us to gauge whether venture capitalists are effective in helping to reduce the cost of capital and encouraging more investment. Compared to other strategies, exiting a VC investment by means of an IPO is highly attractive as it not only leads to high valuations of the portfolio companies but also it opened venture capitalists the opportunity to attract attention and credit within a still relatively young VC market. Although the compensation of the VC's investment is determined by the exit price (offer price at IPOs) and hence they would want it to be as high as possible, they are also repeated players who regularly have to raise new funds and hence face reputational risk. Hence, one would expect that much like prestigious underwriters or auditors, venture capitalists certify the quality of a company when going public. This constraints the pricing of the VC-backed IPOs. This certification role of the venture capitalists as well as underwriting banks are analyzed using a German data set which provides detailed information about both venture-backed and non venture-backed IPOs on the German 'Neuer Markt' during the period March 1997 to March 2002. The data includes information on the issuing companies, the offering characteristics as well as on the underwriters. In total, the data set contains 353 issuing companies. Detailed information was collected from the issuing prospectus for each IPO on the total volume of issues, the issuing procedure, the offering expenses, the number of shares outstanding, the age of the company, the number of employees, the ownership structure, who is members of the "Aufsichtsrat" (i.e., the board of directors), the identity of invested venture capitalists or rather private equity companies and underwriters, and data out of the financial statements. Additionally, further information was obtained through the media such as the first day of trading, the book-building spread, the initial offering price and the closing day bid price for the first day and 20 days after the IPO and information on the over-allotment option exercise (greenshoe). To clearly some characteristics of the private equity firms which financed the listing companies—such as their age— their Internet websites and company reports as well as the list of the members of German and European Venture Capital Association (BVK and EVCA) were used. Finally, for the construction of the underwriter's rating the information needed on lead management at all Frankfurt stock market segments since 1990 was provided by the Deutsche Börse.

Based upon the data set, the author finds that companies going public had to bear on average, total direct flotation costs of 8.89% of gross proceeds and an indirect cost in the form of underpricing of 49.81%. In other words, the average issuing company could have raised about €28 million more, if the market price would have been in correspondence with

the offering price. Substantial cost savings can thus be realized through reducing underpricing. The author also finds evidence that the higher the ex-ante uncertainty about the value of a company going public, the higher the underpricing. With regard to the certification role of venture capitalists and/or underwriters, the author does not find evidence that hiring a prestigious intermediary reduces the degree of underpricing. Furthermore, contrary to previous argument in the literature that the degree of underpricing for VC-backed IPOs should be smaller compared to non VC backed IPOs due to a reduced ex-ante uncertainty concerning the value of the issuing company, the author finds that the involvement of a prestigious venture capitalists leads to a higher underpricing. The results holds even when controlled for venture capitalists not selling at the IPO or for conflicts of interest due to an affiliation of the venture capitalists and the underwriting bank.

3) "Are *IPOs of Different VCs Different?"* by Tereza Tykvova and Uwe Walz.

This research paper sets out to analyze the influence of different types of venture capitalists on the performance of their portfolio firms around and after IPO. Venture capital and IPOs are closely interrelated as VCs crucially rely on the IPO market as an exit channel. Without firms that want to issue equity, IPO markets would obviously lack supply. Since VCs are intermediaries specialized in nurturing young (innovative) firms, a viable venture capital industry "feeds" the IPO market. Under these circumstances it is important to understand the role venture capitalists play with respect to the market performance (around and after the IPO) of their portfolio firms. The main objective of the paper is to investigate the impact of VCs' corporate governance, experience and objectives on the performance of their portfolio firms around and after IPO. In doing so, additional light is shed on the function of venture capital in nurturing and developing their portfolio firms as well as on some mechanisms of the IPO market. The main working hypothesis is that venture capital was too heterogeneous to permit simple comparison between non-venture and venture-backed firms. In order to pursue its objective, the paper compared the performance of firms backed by different VCs and non-venture backed firms in the course of IPO, looking at the extent of underpricing and at post-IPO returns and volatility.

The starting point of the analysis is the observation that VCs differ considerably in their objectives, track records, and governance structures. Consequently, different VCs resolve informational asymmetries and incentive problems to a different degree. The study is based on a unique hand-collected database embracing all IPOs that have occurred on Germany's Neuer Markt. In its short history, there were 327 IPOs on the Neuer Markt. Information collected on IPOs includes: the duration of the venture capital financing before IPO; the firm age and size; the name(s) of the lead underwriter(s); the shareholder structure (prior to and immediately after IPO); and the book value at the IPO. The set of VC-backed firms was divided into four subgroups, depending on the institutional affiliation of the lead VC. The authors distinguish between four types of VCs: public, bank- (or insurance-) dependent, independent, and corporate. Further, the paper looks into whether the headquarters of the lead venture capital firm was in Germany. Data was also collected on the quality and experience of venture capitalists, underwriters, and Designated Sponsors.

The main finding is that significant differences among the different VCs exist. Firms backed by independent VCs perform significantly better two years after IPO as compared to all other IPOs, and their share prices fluctuate less than those of their counterparts in this period of time. Thus, independent VCs, who concentrated mainly on growth stocks (low book-to-

market ratio) and large firms (high market value) were able to add value by achieving a lower post-IPO idiosyncratic risk and a higher return (after controlling for all other effects). On the contrary, firms backed by public VCs (being small and having high book-to-market ratios) showed relative underperformance. The fact that this was possible implies that market participants did not correctly assess the role played by different types of VCs. Overall, different corporate governance structures, experience levels, and objectives among the different types of VCs actually did have an observable and significant impact on the portfolio firms' post-IPO performance. These findings imply that the different types of VCs fulfilled their overall task as specialized monitors, consultants, and financiers of young firms in quite different ways.

4) "Quid *Pro Quo in IPOs: Why Book-building is Dominating Auctions*" by François Degeorge, François Derrien and Kent L. Womack.

The last paper examines the important question of whether financial analysts help to improve the access of innovative firms to private equity market. When they try to access outside finance, young, innovative firms face an information asymmetry problem: outside investors know less about the company's prospects than management. Moreover, investors generally do not have the time or resources to bridge this information gap by performing their own independent assessment of the firm. Thus, information asymmetry leads potentially to an undersupply of funds to innovative businesses. Sell-side financial analysts can potentially play an important role in bridging the information gap. Indeed, it is their role – for recently floated companies as well established stocks – to analyze companies' financial information and issue expert unbiased, impartial opinions to investors. The "coverage" of stocks by financial analysts takes the form of research notes, earnings forecasts and investment recommendations. However, one would expect that since financial analysts are often associated with investment banks' corporate finance operations, they would be under pressure to provide positive coverage of the companies taken public by their employers. Indeed, a US study has found that IPO investment recommendations issued by financial analysts associated with the bank that underwrote the IPO tend to be excessively optimistic. This finding is consistent with the notion that financial analysts are subject to a conflict of interest and cannot be trusted by outside investors. This has important implications for policy: outside investors may no longer trust financial analysts to bridge the information gap between them and entrepreneurial companies seeking outside finance. This may in turn reduce the ability of entrepreneurial companies to tap public equity markets. However, the finding is also consistent with a reverse causality: conceivably, banks decide to underwrite an IPO precisely because they are optimistic about its prospects.

To shed light on this issue, the authors look at analyst recommendations in French IPOs. French IPOs are well suited to this exercise because of institutional characteristics unique to the French market: in France, companies going public can use one of two issuing procedures to go public. One of these procedures (an auction procedure) involves the underwriting bank much less than the other (a book-building procedure): the potential for conflict of interest is much diminished in the auction procedure. If the conflict of interest view is correct, then one should find that the recommendations issued by analysts affiliated with the underwriter would be more optimistic in a book-built IPO than in an auctioned IPO. Data were collected from a sample of book-built (114 cases) and auctioned IPOs (90 cases) completed on the French stock exchange between January 1993 and August 1998. The information about the characteristics of the IPO firms and the details of the offering comes directly from

preliminary prospectuses. This information consists of the financial statements of the company in the years preceding the offering, the IPO mechanism used, the number of shares offered, the initial price range (for book-built offerings) and minimum price (for auctions), and the names of lead underwriters and co-managers. For each IPO in the sample, analyst recommendations were collected from the I/B/E/S analyst-by-analyst recommendation database. The authors consider analyst recommendations issued in the one-year period following the IPO. For each recommendation, the date of the recommendation is available, and the type of the recommendation (classified by I/B/E/S as 1: strong buy, 2: buy, 3: hold, 4: under perform, and 5: sell), and the name of the broker who issued the recommendation. Overall, 845 such recommendations were identified for the 204 IPOs in the sample. Information were also collected on the number of reports written by brokers in the year following the offering and on the number of newspaper articles written about the IPO companies from six months before the offering to one year after the IPO. Moreover, information on equity issues realized by the sample IPO companies in the five-year period following their initial offering were hand collected from the company files stored by Euronext.

Based upon this data set, the authors' find convincing evidence that underwriters employing book-building implicitly commit to providing more favorable coverage to the companies they take public in the aftermarket. Specifically, they find that analysts affiliated with the lead underwriter of the offering issue more (and more favorable) recommendations for recent book-built IPOs than for auctioned offerings. They also find that these analysts provide "booster shots", that is, positive recommendations following poor stock market performance, to recent book-built IPOs. This behavior was not observed in auctioned offerings. In addition, book-built IPOs receive more press coverage after the IPO. This observation provides not only a rationale for the current predominance in book building relative to auction procedure for selling IPOs (as companies have an interest in the favorable coverage by analysts) but also a strong support for the conflict of interest view. The obvious policy implication is that financial analysts cannot play its role in information provision unless there is a separation of financial analysts from underwriting companies.

C. Policy-Relevant Conclusions of research in Theme 1

This section provides a brief summary of policy implications that are a consequence of or directly related to the research carried out under Theme 1 of the RICAFE project. This summary is organized along the main lines of policy initiatives or avenues of institutional, legal and fiscal framework set by public policy that are discussed in the Risk Capital Action Plan (RCAP) of the European Community.

Legal environment: investor protection, prudential rules to allow investors to invest in venture capital.

Measures of investor protection seem to be a crucial determinant in explaining the development of risk capital sectors across countries. This is emphasized in the research carried out by Arcot and Bruno, and by Cumming, Schmidt and Walz. The better investor protection in the UK seems to be a major factor explaining the much higher prevalence of venture funding there, as well as the deeper penetration of public equity markets into the segment of young and medium-sized firms. Not only does a higher degree of investor

protection allow dispersed ownership and the entry of relatively less sophisticated investors in high-growth segments, it also facilitates the organization of the venture capital industry. It facilitates syndication, i.e. risk and knowledge sharing, among venture capital providers. Finally, it facilitates and accelerates the deal originating process by providing judicial security to potential investors in the due diligence phase.

Corporate Governance rules

Cumming, Schmidt and Walz investigate the role of corporate governance for the success of venture-backed innovative companies. This is well understood for publicly listed firms, but in fact the role of corporate governance measures begins much earlier. In financial systems with better corporate governance rules, venture capitalist have a significantly higher board representation. Thus, corporate governance rules act as a prime facilitator to entice venture capitalists to adopt a role as active advisors and monitors. The role of this second contribution of venture capitalists besides the provision of capital, their active participation in the value generation process, seems to be one of the main differences between European and US VC. Its importance is emphasized in the work by Da Rin, Nicodano and Sembenelli.

Accounting and disclosure requirements

Reporting biases (over-reporting) are significantly more likely in systems with lax accounting standards, as Cumming and Walz show. Distorted reports are known to create frictions on capital markets, especially in highly information-sensitive capital markets like those for innovative firms. This research output clearly calls for action to tighten accounting standards, especially on information-sensitive areas like the R&D accounting and other intangibles and accruals.

Initiatives for the creation of high-growth stock markets

Da Rin, Nicodano and Sembenelli find evidence that the creation of high-tech stock markets in Europe starting in the late 1990s had a positive impact on venture funding activity. This is in line with the hypotheses coming out of their related theoretical research and slow with the hope expressed in the RCAP action plan. Venture funding activity, however, does not automatically translate into venture success, i.e. the creation of successful innovative companies and projects, and policy must set the conditions right to enable that it indeed does. Such a caveat is warranted since this natural experiment coincides with the Internet bubble period. And Arcot and Bruno argue that the new European stock markets have been less successful than their US-based role model, the NASDAQ market.

The work gives a finer picture of regulatory instruments and their impact and success and failure of high-tech stock markets. Degeorge, Derrien and Womack show a new and importance piece of evidence on regulatory failure in the architecture of the new markets. By leaving the choice of the IPO mechanism to the discretion of the market participants, investment banks could in fact impose the book-building mechanism which they favor for obvious reasons, since it leaves them full discretion to allocate IPO shares to favorite customers and thus to enforce quid-pro-quo relations with stock market analysts. This paper is a call for policy action to impose tight standards on IPO mechanism and the rules and

oversight for share allocations in primary equity markets. Ellul and Pagano emphasize the importance of aftermarket liquidity in high-tech segments like the London-based AIM; regulatory action concerning market design must keep an eye on stable and predictable liquidity conditions in the IPO aftermarket.

Public venture funding and public subsidies for risk capital

Da Rin, Nicodano and Sembenelli show that there is no evidence of a shortage of risk capital that would justify public subsidies. They also find no evidence that public subsidies for venture capital or R&D expenditures have a positive impact on the success of innovative activities. Thus, our research comes so for to a highly skeptical conclusion relative to this long-time favorite of public risk capital initiatives in Europe.

Corporate and income taxation policies

Da Rin, Nicodano and Sembenelli show that incentives for investments in innovation via reductions in capital gains taxes work, and are likely to lead to a significant increase in R&D spending.

Theme 2: How risk capital influences the ability of innovative firms to translate scientific and technological advances into successful products.

A. Summary

The main objective of the research papers under Theme 2 is to provide an understanding of the mode of operation of the venture capital (VC) firms/industry and its impact on innovation. As VC funds are the main source of financing for innovative projects, the effectiveness with which the VC industry is able to channel funds into financing innovative projects will have an important impact on the creation of successful innovative companies and hence on the rate of innovation of an economy. The ability of VC firms to finance more projects depends naturally on their profitability and their ability to overcome agency costs, which in turn depend on their mode of operation. The aim of the work packages under this theme is to provide both an empirical and a theoretical perspective of the following aspects of the mode of operation of the VC industry: First, the exit decision of the VC firms and their impact on the financing of their portfolio companies. Second, the impact of contractual and non-contractual characteristics of venture capital on firms' innovation decision. Third, an evaluation of the ability of public support to encourage the growth of the risk capital market. Fourth, the link between the modality of financing and the protection of intellectual property rights. Addressing the above issues will greatly improve our understanding of the functioning of the risk capital market and its ability to assist companies in bringing out successful innovative products. Our report revolves around four key topics.

To this direction, *"Sources of finance and the choice of innovation activities in entrepreneurial firms"* is devoted to a study of the modality of innovation financing on the strategic decisions of firms. Thus the questions that we are interested in addressing include the relationship between the type of venture capitalists and the amount of innovation undertaken by portfolio companies, an assessment of the link between financing and corporate governance in large as well as innovative growth firms, an analysis of the way in which non-contractual means can be used to reduce agency costs and finally, the impact of the venture capitalist exit decision on innovative behavior. The research papers provide both theoretical and empirical perspectives on the questions raised. In particular, the various authors find that corporate behavior is greatly affected by the existence of active outside investors and that venture capitalists can greatly improve the efficiency through which funds are made available to innovative firms. This can be achieved by using contractual structures which ensure that optimal exit decisions are taken, both with respect to returns for investors but – more importantly – also with respects to the incentives of entrepreneurs to engage in innovative activities. It is also shown that the initial creation (out of entrepreneurial innovative activity) and the further development stages of a business might depend on different contractual and governance structures. Professional investors can take these aspects into account when devising contractual frameworks. Alternatively, efficiency is enhanced by building a reputation for credible announcements for the quality of their portfolio firms at initial public offerings (IPOs) and by committing to a low initial funding of their portfolio firms. This also reveals further aspects between the development of financial markets and the potential for successful financing and development of entrepreneurial firms.

"Public incentives for venture capital and their effect on the development of commercially useful innovations" is devoted to an empirical and theoretical analysis of whether and how public provision of venture capital can play a role in encouraging the development of the local venture capital industry. Given, the difficulty of young innovative firms in obtaining finance through traditional means, there is a need for some form of public support. In what form should this public support take is the type of issue we try to address. The research papers contain an empirical assessment on the different types of public incentives for the support of innovative firms, focusing in particular on risk capital instruments. A cross-country comparison of the different European experiences is made to give further insights on the critical elements in public programs that favor the development of the risk capital market and private investments. In a theoretical analysis it is shown that some public policy programs observable in Europe may not satisfy their purpose: given the complexity of contractual structure in the financing of entrepreneurial firms, public policy has to take into account its effects on these structures. Failure to do so results in a general reduction in welfare.

"Financing, contracting, intellectual property rights and firms' innovative strategies" provides crucial theoretical analyses of the contractual aspects of venture capital which will have important impact on the innovative strategies of firms. The contractual relationships between the venture capitalists and their portfolio firms are important as contracts are necessary to overcome the various agency costs present in the relationship and the design of the contracts will have an important impact on the efficiency with which projects are financed and hence on the efficiency of the allocation of funds by the financial sector. The first question addressed under this topic is how market characteristics like competition, expected profitability, entry costs and capital market transparency affect the way venture capital operates in terms of their financing strategy and contractual relationships with their portfolio firms. Second, the use of benchmarks by venture capitalists to reduce agency costs are analyzed in the light of their impact on the optimal allocation of funds to the various stages of an innovative firm's research projects. Third, the relationship between limited and general partners of a VC fund also affects strategic decisions by VC managers. The resulting effects of these structures on the success of portfolio companies are then evaluated. Lastly, the link between financing mode for the defense of patents and the ability of innovative firms to protect their inventions against infringes are studied.

The remainder of the discussion is organized as follows: the next section provides an overview of the different research papers and how they address the research objectives of Theme 2. It then provides a description of the main findings of the various research efforts. Finally, it summarizes relevant policy implications that are a consequence of the research findings.

B. Detailed Report on the Research Findings

The following section presents a review of the research results of the RICAFE project, organized around the four main topics we have addressed. For each topic, we detail the findings of the relevant research papers.

"Sources of finance and the choice of innovation activities in entrepreneurial firms"

This topic provides an evaluation of how European risk capital markets affect the behavior of venture capitalists and its effects on the choice of innovation activities by entrepreneurial firms, where we take into account legal and regulatory constraints. We also evaluate how strong credit constraints are in Europe and how corporate venture firms may reduce such constraints.

We have provided six research papers for this topic. The papers by Arcot and by Bottazzi, Da Rin and Hellmann look at different aspects of how legal aspects affect the behavior of venture capital firms, and this way induce different choices by entrepreneurial firms. Anderson and Nyborg provide a theory of the effects of finance on the growth of innovative firms, where entrepreneurial moral hazard can be quite strong. Two papers, by Neus and Walz and by Bienz, explore (from a theoretical perspective) how venture capital firms choose their exit from entrepreneurial companies, and how this provides innovative companies with incentives for innovation. Finally, Inderst and Münnich bring the analysis to corporate venture capital investors.

1) "*Participating Convertible Preferred Stock in Venture Capital Exits*" by Sridhar Arcot.

The first research paper analyzes the use of an important contractual structure between VC investors and entrepreneurs when innovative projects are financed: Participating Convertible Preferred (PCP) securities, which are an empirically observed form of convertible securities. The latter play a dominant role in innovation financing in the US VC market. The most surprising aspect of PCPs is that they usually entitle the VC investor to participation or preferred rights in the event of a trade sale or merger of the portfolio company with another firm. In contrast, when the investment exit takes place via an IPO, this usually triggers automatic conversion of the convertible stake into common equity, resulting in a considerable loss of cash flow rights for the VC. The question arising is then: Why is a VC prepared to incur this loss, and why only in the case of IPOs but not in a trade sale? The author rationalizes the use of these securities within a theoretical framework that captures some of the crucial aspect in the relationship between entrepreneurs and VCs, and takes into account the way, successfully developed firms are then brought to the market. The paper thus contributes to explaining important aspects of the complex contractual structures used in the financing of innovative firms and shows how these are linked to disinvestment decisions once portfolio firms mature.

The author argues that current explanations for PCPs do not sufficiently take into account their different use in exit decisions. Instead, he attributes the value of such contractual forms to the need of VCs to signal the quality of their investment to the diverse set outside investors during an IPO who do not have perfect information about a firm's quality. On the other hand, buyers in a trade sale are usually better informed and are granted access to company books in order to undertake due diligence analyses. Additionally, it is widely

agreed that entrepreneurs benefit from staying "on board" of their firms even after a VC's exit. As this is usually only achieved via IPOs, the paper shows how the contractual structure of PCPs not only raises the probability of IPOs per se, but also improves the incentives for entrepreneurs to provide effort during the development of the business. Hence, PCPs also ensure that the innovation activities of the entrepreneur – which are crucial to the success of the new business – are sufficiently rewarded. Both problems arising out of asymmetric information among the VC and investors, as well as incentive considerations are taken into account within a single contractual structure like PCPs.

The paper considers a portfolio company, which has developed into a viable business and has to be sold by a VC due to the limited lifetime of VC investments. As the future development of the business requires further investments, new investors have to be found to provide follow-on financing. Even though informed industrial buyers are available as investors, sale via an IPO carries positive benefits for both VCs (via reputational gains) as well as the entrepreneur (due to benefits from continuing his business idea). As exit decisions are usually made by the investor (VC), the entrepreneur might anticipate a trade sale in the future and not provide maximum effort for the newly created business to become a success in the first place. It is shown how the combination of PCPs and exit choices can serve as signals to market participants such that high-quality firms are sold via an IPO and entrepreneurs provide their important effort from the start of the venture. The paper is then able to derive a link between IPO activity and financial market development via the contractual structure: Less developed financial markets with correspondingly higher asymmetric information between industrial and market investors deter VCs from IPOs as exit routes because the costs of signaling are too high. Consequently, a well-developed structure of financial intermediaries affects positively the sale of high-quality firms in IPOs, which is a pre-requisite for entrepreneurial effort, and the creation of successful new businesses.

2) "*What Role of Legal Systems in Corporate Governance and Contracting? Theory and Evidence from Venture Capital*" by Laura Bottazzi, Marco Da Rin and Thomas Hellmann.

The research paper studies on a micro-level how the relationship between an investor and entrepreneur depends on the legal system. Existing studies on the link between legal and financial systems, based on country-level data, document that variations in legal systems induce significant differences in institutions and economic outcomes. However, the aggregate nature of these data makes it difficult to go beyond documenting the existence of strong correlations. Micro-level data appear more suitable to identify the channels through which legal systems affect institutions and outcomes. This paper moves in this direction and asks how financial intermediation is affected by the nature of the legal system. Specifically, it looks at how the relationship between a VC investor and an entrepreneur depends on the legal system. Europe lends itself as an excellent object to examine differences across legal systems: member countries are reasonably comparable in their stages of economic growth, yet there is a rich variety of legal systems within Europe.

The analysis is both theoretical and empirical. In the theoretical part, the paper develops a double moral hazard framework showing how optimal contracts, corporate governance, and investor actions depend on the legal system. With better legal protection, investors want to exercise more governance, give more non-contractible support, and demand more downside protection by using securities such as debt, convertible debt, or preferred equity. Moreover,

investors in better legal systems have stronger incentives to develop the competencies necessary to provide governance and value-adding support. These model predictions are tested using a hand-collected dataset of European venture capital deals and allows for various parameters determining the quality and characteristics of a legal system (such as legal origin, rule of law and procedural complexity). The dataset contains European venture capital investments for the period 1998-2001. The sample consists of over 1,400 venture deals from over 120 venture capital firms in 17 with a comprehensive survey of all venture capital firms in these countries being the primary data source.

The empirical analysis finds strong support for the theoretical predictions. Better legal systems tend to be associated with more governance, more investor involvement and more downside protection for the investors. The results hold for legal origin, using the standard interpretation that the Anglo-Saxon common law system is better for investors than systems based on civil law. They also hold for two widely used alternative index measures of the quality of the legal system: the rule of law and the degree of legal procedural complexity. These results point to the importance of considering the relationship between investor and entrepreneur in its entirety, accounting for the interdependence between its contractual and non-contractual aspects. Using the information from investments that cross legal system boundaries, the authors find that the effect of the legal systems of both company and investor matter. This suggests that investors bring some of their 'style' with them across systems and that there is more than learning and adaptation, which determines the behavior of VC investors. Overall, the prediction is supported that legal systems may affect financial intermediation not only by determining contractual features and non-contractual actions, but also by shaping the extent to which financial intermediaries invest in developing competencies, and therefore the way they relate to entrepreneurs.

3) "*Financing and Corporate Growth under Repeated Moral Hazard*" by Ronald W. Anderson and Kjell G. Nyborg.

This theoretical paper considers the impact of finance on growth by exploring a model where entrepreneurs need both outside investors to provide funds and outside managers to operate the firm efficiently once assets are in place. It provides a micro foundation for the interaction between finance and growth when different financial structures have an explicit impact on the pace of technological change both through the rate of creation of growth opportunities and in the pace of the adoption of new techniques. Specifically, the paper examines the implications of financial contracts for the growth of the firm both at initial stages when the product idea is developed and at later stages when the firm can take its operations to a higher, more profitable level. The framework is designed to capture the simple fact that a founding entrepreneur who can contribute most to the firm at one stage of its development may well become a source of under-performance later. These features are modeled by considering the problem of an entrepreneur who in an initial stage chooses whether to undertake R&D. Given a successful outcome of R&D, the entrepreneur attempts to implement the product idea by obtaining external financing, needed to make capital investments, and then by initially managing the firm. At some stage, however, the firm can be made more profitable by the appointment of a more able, outside manager. The research paper thus analyses the consequence of subsequent financing choices (for example in IPOs) for the total value of a successful R&D outcome.

The possible financial contracts considered are inside equity, outside equity, and debt. The source of contracting inefficiency is that insiders can divert cash flows for their own benefit. In this context, there are several distinct obstacles to achieving efficiency. First, positive NPV R&D projects may not be undertaken because the entrepreneur's returns are too low. Second, post R&D, positive NPV capital investments may not be done because sufficient external financing cannot be raised. Third, post capital investment, the firm's assets may be operated inefficiently. The combination of these three elements is at the heart of the interaction between financial contracting and the creation of growth opportunities. The model is hence consistent with the idea that equity will be chosen by technological firms with large amounts of intangible assets: Initial insiders (founders) of such firms have inalienable human capital, which depreciates relatively slowly. Therefore, they may enjoy a relatively long period during which they will be retained by outside shareholders. As a result, equity finance will give them adequate incentives to develop the product idea in the first place. However, the backdrop of this is that future equity financing necessary to develop the enterprise further might not be available. Socially profitable business development is thus hindered. On the other hand, contracting arrangements, which make it easy to improve a business by changing management, may discourage the creation of growth opportunities in the first place.

In comparing the growth implications of debt versus equity, it turns out that debt promotes the creation of growth opportunities, possibly at the expense of efficiency once the firm is up and running. The reason is that debt encourages an entrepreneur to do R&D in the first place. In contrast, equity promotes the implementation of improvements, possibly at the expense of the creation of growth opportunities. In sum, debt favors first stage growth; equity favors second stage growth. Similarly, when managerial moral hazard is great, one would expect debt contracts to be relatively common and outside equity finance relatively uncommon. In contrast, when managerial moral hazard problems are less severe, then outside equity may be relatively more widespread.

4) "*Exit Timing of Venture Capitalists in the Course of an Initial Public Offering*" by Werner Neus and Uwe Walz.

This paper analyzes the disinvestment decisions of venture capitalists in the course of an IPO of their portfolio firms. Due to the structure of the venture capital industry, in which often closed-end funds are used, and due to their comparative advantage in start-up finance, venture capital firms are engaged in their portfolio firms for only a limited period of time. Unwinding the engagement in the portfolio firm in the course of the exit process is therefore one of the most important determinants of success for venture capital firms. Among the different exit channels, the initial public offering (IPO) of shares in the portfolio firms is often regarded as the most essential one in terms of its contribution to a venture capitalist's return. Therefore understanding the disinvestment strategy of VC firms at IPOs will help in advancing our understanding of the recipe for a successful VC industry which plays a crucial role in helping to channel funds to innovative new start ups.

The key question that the authors seek to answer is whether it is optimal for the VC firm to exit at the time of the IPO or to postpone the disinvestment to a later period. The fact that VCs, as inside investors, are typically better informed, at least for some period of time, about the quality of their portfolio firms than are outside investors in the capital market. That is, whereas information asymmetries do exist at the time of the IPO, they vanish over time. Therefore, VCs wanting to disinvest a single high-quality portfolio firm face the following

trade-off. On the one hand, late disinvestments are associated with large opportunity costs; on the other hand, they may help to overcome information costs, i.e. a low price for such ventures as outside investors do not know the true value of the firm at IPOs. This trade-off leads to the possibility of equilibrium with late disinvestment of the most profitable firms. With the aid of a static model, the authors identify a number of characteristics whereby early disinvestment is more likely, namely when there is a high demand for liquidity by VC firms, a low degree of uncertainty and a large average proportion of high quality firms.

The authors argue further that one needs to take into account that venture capitalists are identifiable and repeat players in the IPO market. It is then possible that some VC firms will be able to establish for themselves the reputation for credible announcements of the quality of portfolio firms in the course of the IPO and hence enabling them to sell their venture early at the "correct price". This avoids the welfare costs associated with disinvestment decisions during an IPO. Extending their basic model to a dynamic setting to take care of reputational issues, the authors establish that a high market share on the part of an individual VC firm facilitates the building up of reputation, together with a high degree of credibility and low price uncertainty. Experienced VCs with a high market share is thus expected to disinvest early and to be able to sell even their high quality firms at close to their true value. On the other hand, young unseasoned VCs have an incentive to engage in underpricing in order to build up their reputation. Furthermore, they also show that VCs engaged in high-risk ventures have greater incentive to establish a reputation for not reporting falsely on the quality of their ventures. Finally, they show that a careful selection of ventures on the one hand, and late-stage investment in the value of the portfolio firms via intense management support on the other hand, constitute clear substitutes. VCs with an expected preponderance of high-quality firms have little incentive to undertake investments in the improvement of firm value via intense management support in late stages. This suggests the formation of clientele groups. Typical VCs, who are highly specialized in active investment, will disinvest late and provide very little price uncertainty. They will sell "mature" firms. More conventional financiers, who have little competitive edge in the area of "active" investment, will disinvest early and provide for a higher degree of price uncertainty.

5) "*A pecking order of venture capital exits – What determines the optimal exit channel for venture capital backed ventures?*" by Carsten Bienz.

This paper looks at the choice of exit of a VC investor after an entrepreneurial firm has matured. Being specialized intermediaries who provide money, advice and monitoring, VCs loose their comparative advantages from specialization once companies have reached certain maturity. Additionally, VCs raise money via closed-end funds that are dissolved after ten years. The exit decision is therefore highly relevant for VCs when financing young innovative firms. The paper also provides an explanation why observed returns from VC backed IPOs exceed returns from trade sales. It shows how the optimal exit choice depends upon the expected profitability of the venture.

While there are several different exit channels, this paper focuses on IPOs and trade sales, which are by far the most important ones. Each channel differs in its allocation of issuing proceeds and its provision of incentives: in a trade sale, usually the whole firm is sold to an outside investor, namely (larger) corporations; in an IPO, the founders do not completely sell their shares. This research paper highlights the role of post-IPO corporate governance issues that might affect the optimal decision to go public. In very successful firms the

entrepreneur's equity stake in the venture assures incentive compatibility and thus limits redistribution from the VC to the entrepreneur. In firms that are less successful, moral hazard matters more in relation to profits than in successful firms and thus corporate governance becomes more important. Therefore firm characteristics determine for every type of firm a different optimal exit channel. The analysis provides an explanation for a "pecking order" of exits: Highly profitable companies go public whereas less profitable companies are sold in trade sales. This result suggests that the common notion that an IPO is per se more profitable than a sale may be misleading, as observed returns suffer from selection bias.

Post-IPO governance aspects provide an explanation why IPOs show higher returns than trade sales: the exit decision includes the decision about the extent of the realignment of ownership and control. The better the company, the less control is needed and the less realignment needed. This may allow for an IPO with lots of passive shareholders and controlling shareholders that hold only relatively small stakes. Contrary, if the company needs lots of control this is not possible and a complete realignment of control is necessary. This requires the founder to give up his stake and to relinquish his control and its associated benefits.

6) "*The Benefits of Shallow Pockets*" by Roman Inderst and Felix Münnich.

This research paper argues that an investor can improve his ability to deal with entrepreneurial agency problems by a commitment to `shallow pockets', namely by limiting the size of funds raised initially. Venture capital finance frequently takes place in an environment in which informational problems are severe. Not only it is difficult for venture capitalists to assess the quality and potential of business plans submitted to them for funding, but once initial funding has taken place, entrepreneurs must be given adequate incentives and must be monitored. Much of the recent theoretical literature on venture capital finance has concentrated on contractual means to mitigate agency problems.

This paper departs from the existing literature by considering non-contractual instruments to control agency problems, namely the initial size of the investor's funds. The authors derive conditions under which non-contractual means of limited funds increase the responsiveness of the entrepreneur's payoff to the profits generated by his project. When this is the case, the benefit of improved incentives may outweigh the costs of inefficient refinancing by the initial investor, e.g. the increased cost of refinancing through uninformed outside investors or the failure of receiving funding for the second stage at all. The authors find that raising limited funds is an optimal strategy when the following two conditions hold: first, the probability that a given project fails at the interim stage is relatively high; second, the incremental returns from improving the project are relatively small compared to the absolute value of financial rewards if the project is a success.

Intuitively, if the probability of failure is high this reduces the expected allocation inefficiency implied by limited funds. Similarly, when the incremental project payoff from an improvement is small compared to the overall payoff of a successful project, standard incentive contracts are relative weak in providing incentives. In this situation, creating competition through limited funds may provide more powerful incentives since even a small change in performance (due to the correct action) may be crucial in determining whether refinancing is obtained, and the (relatively large) financial rewards associated with it are

reaped. These two conditions, i.e. the high failure rate and the high rewards in case of having the `right idea' as opposed to some incremental improvements, may apply to some of the projects financed by venture capital.

In an adverse selection setting, the increased responsiveness of entrepreneurial payoff to type under shallow pockets is shown to create a single-crossing property that is absent when the investor has deep pockets. As a result, shallow pockets allow good entrepreneurs to separate themselves from bad entrepreneurs by exposing themselves to competition for refinancing.

Anecdotal evidence suggests that the mechanism presented in this paper plays a role in the design of venture capital funds. These are typically close-ended and governed by covenants that render additional fund-raising at a later life-cycle stage of a fund difficult. So-called `down rounds', in which the worst-performing start-ups must raise additional funds at reduced valuations from outside investors are a testimony to the fact that venture capitalists `manage' their portfolio and distribute funds according to performance.

"Public incentives for venture capital and their effect on the development of commercially useful innovations"

In this topic we address the role of public intervention in risk capital markets, assessing the European experience and providing a conceptualization of the underlying issues.

We have produced two research papers for this topic. Di Giacomo broadly examines the actual policy choices, which can be observed across European countries. Hirsch provides a theoretically inquiry of the optimal form of public intervention for entrepreneurial firms.

1) "*Public Support to Entrepreneur Firms: An assessment of the role of venture capital in the European experience*" by Marina Di Giacomo.

This paper aims to highlight the role of public intervention in the equity market and whether such an intervention competes or complements the private venture capital market. It is well known that young firms with no track record and little collateral have difficulties getting funding from traditional sources. Some form of public support is thus needed to overcome this market failure. Public support for these firms has a twofold effect: first, these target groups immediately obtain funds, otherwise unavailable; second, a certification effect operates. Public commitment may attract private investors and the private equity market increases as a consequence of the initial public intervention. Most of the programmes in the European Union favoring equity provision aim to both objectives. In some countries, such as UK, Germany, France and Finland the leverage effect was successful and empirical evidence prove that public intervention is not only effective in ensuring high growth to financed firms, but also in increasing the VC market in some regions. The latter effect is important since growing empirical literature has demonstrated that VC backed companies have superior performance than non VC backed firms on a number of grounds: access to lower bank interest rates, best post IPO performance, higher growth, larger revenues and R&D expenditures and larger spillovers across firms in the same industry with more registered patents. It is increasingly recognized that a vibrant venture capital industry is the cornerstone of America's leadership in the commercialisation of technological innovation and that the lack of venture capital hinders Europe from competing on equal footing.

Several types of non-grant public support, in particular, risk capital instruments, for firms were identified in the study. These types of support include direct funding of venture capital funds, regulatory reforms, tax incentives, guarantee schemes, as well as support for the creation of business angels networks. The author then compares the role of public programmes in the VC market across some European countries. The author finds that while public direct involvement in the VC market in the 1990s contributed to increase the private equity market, nowadays the focus has slightly changed, especially in those countries where developed attractive VC markets exist. The public role now focuses on filling the "equity gaps" existing in the VC markets and the first objective is growth (especially job creation) in the country/regions. The author finds that countries with modern dynamic VC markets (UK, France, Germany, Nordic countries) have either reduced their direct VC investments (e.g. privileging the creation of fund of funds) or delegated their policies to local agencies. On the contrary in the South of Europe, where the private VC market is underdeveloped, there is still room for a direct public commitment, which acts as a leverage for private investors.

The author cites some key elements, which are crucial for the success of the public programmes. First, the ability to recycle funding after equity has been sold. Second, a fund structure that allows for the use of European funds and for the leveraging by private investors. Third, the availability of professional and independent fund management operating on a commercial basis. Fourth, the existence of management incentive schemes linking remuneration to fund performance. Fifth, the design of clear investment guidelines to target investment to the area being helped and concentration on companies who would not otherwise obtain finance. Sixth, establishing linkage with local communities in order to encourage entrepreneurship as a regeneration and social inclusion catalyst. In particular, the independence of the fund and its management by professional experienced advisers (e.g. using the support of private fund management companies) choosing projects on a commercial basis seems to be a critical issue ensuring the success of the programme. The author concludes that public intervention in the VC market should adequately be designed in order to take into account displacement effects of the private sector, projects screening difficulties and regional/industries characteristics.

2) "*Public Policy and Venture Capital Financed Innovation: A Contract Design Approach*" by Julia Hirsch.

This research paper evaluates public policy programs designed to support the VC financing of young innovative firms. Given the close relationship between financial development and economic growth and the importance of the venture capital industry for the growth of young innovative firms with few tangible assets, various public policy programs have been set up in European countries. They generally share the aim of promoting the development of innovative firms by improving their ability to be financed. Venture capitalists are specialized intermediaries who do not only offer financing but also managerial advice and are thus involved actively in the operations of the start-up firms. Moreover, they are confronted with a high degree of uncertainty regarding the value of the investments and little collateral offered by the entrepreneurs. The relationship between the venture capitalist and the entrepreneur can thus be characterized by the existence of severe moral hazard and asymmetric information problems that are addressed by selection of specific contractual structures. Given the important role of explicit contracts, it is essential that an evaluation of public policy measures takes into account their influence on contract design.

Public intervention is usually justified by the existence of positive spillover effects from innovations to the overall economy. Indeed, the existence of such spillover effects is supported by both empirical and theoretical evidence. This paper analyzes public policy programs aiming to internalize spillovers from to successful innovations in a double-sided moral hazard, double- sided adverse selection framework. These spillover effects may depend on the innovative value of a project and can be influenced by both contracting parties through their effort decisions. The central focus of the analysis is the various programs' impact on contract design. Direct public support of VCs includes guarantee programs, all forms of subsidies, technical assistance for venture capitalists, the offer of access to networks and the direct supply of capital through investments by the government. These different measures can be observed in a variety of public policy programs in different countries. It is shown that in the theoretical framework only ex post subsidies are a robust instrument for implementing the first-best solution whereas the success of guarantee programs and ex ante grants depends strongly on the characteristics of the project: in some cases they do not only give no further incentives to the contracting parties but even destroy contracting mechanisms and thus worsen the overall outcome.

Overall, one can conclude that guarantee programs and ex ante grants are doubtful policy measures as they can destroy contracting mechanisms, particularly in more developed markets where participants are more experienced in evaluating innovative projects. Public private partnerships are helpful in the case of spillover effects that are independent of a project's innovative value and public support is useful in a developed market with spillovers dependent on this innovative value. But ex post grants are the most robust and therefore the most suitable instrument as they guarantee the first-best solution independently of the scenario and the market situation.

"Financing, contracting, intellectual property rights and firms' innovative strategies"

In this topic we provide an analysis of how contractual structures may determine the behavior of venture capital firms, with important consequences on the innovation decision of the firms they finance.

Four research papers address this topic. Bergemann and Hege show that venture capital contracts are very important for the selection of truly promising firms, and analyze some of their salient features. Kandel, Leshchinskii, and Yuklea argue that the limited life span of venture funds responds to clear agency problems, it also forces them to inefficiently liquidate portfolio companies, and proposes some solutions to the problem. Llobet and Suarez. Provide an insightful theoretical analysis of patent defense insurance, a theme of great relevance in the policy debate. Inderst and Müller study the role of market conditions on the valuation of venture capital and on the effectiveness of venture capital firms as informed investors in innovative companies.

1) "*The Value of Benchmarking*" by Dirk Bergemann and Ulrich Hege.

The first research paper analyzes the contractual relationships between VC firms and their portfolio companies. Contracts are necessary to minimize the agency problems associated with outside financing of an innovative project. Common agency costs include the incentives for entrepreneurs to invest into efforts that have high personal return (scientific

recognition, investment in human capital, etc) but add little or no value to the venture, and the tendency of the entrepreneurs to continue their projects beyond the efficient stopping time. The importance of the latter problem has arguably been reaffirmed by the slow and expensive wind-down of many cash-burning Internet start-ups after March 2000. While it is well recognized in the literature that stage financing, whereby venture capitalists continue the financing of a project only if the intermediate evaluation of the project is positive, provides a way to mitigate agency conflicts, explicit dynamic studies on how projects are benchmarked, and how the optimal staging policy interacts with the typical conflicts in the financier-entrepreneur relationship, are surprisingly rare. Agency considerations are, however, an important determinant of the optimal funding policy of an innovative project. They influence the research intensity, research layout and the research budget. The authors in this research paper fill this gap in the literature by providing a more detailed understanding of this link by looking at the role of benchmarking.

Explicit benchmarks – either technological or financial are written into contracts to give venture capitalists additional contingent control rights that can be exercised if benchmarks are missed, including the rights to change the management of the venture or to initiate liquidation procedures. The authors find that when the venture capitalist cannot observe whether intermediate benchmarks have been attained, the capital budget allocated to the project will be severely curtailed. It is also inefficient compared to the case where benchmarks can be observed for three reasons. First, there is no abandonment if the early benchmarks are not completed in time, adding to the entrepreneur's discretion and information rent. Second, if the early stages take longer than expected, the remaining budget for the last stages is inefficiently small. Finally, since the venture capitalist is in a position of asymmetric information with respect to the number of benchmarks that have already been met, the incentive payments must be tailored to fit several possible "types" of the entrepreneur, which again increases the information rent.

In the case where benchmarks can be observed, the authors find that agency costs can be considerably reduced and the research horizon of the project extended. This happens through four channels: first, since the project is abandoned once a benchmark is not met within its pre-defined horizon, the information rent of the agent is dramatically reduced. In the simplest and perhaps most instructive case (immediate incentives), the compounding period of the information rent is shortened to the maximal duration of a single stage, rather than the maximal duration of the entire project. Second, benchmarking makes it possible to define optimal and inter-temporally consistent research budgets (research horizons) for every single stage. An important advantage is that these budgets will be independent of the history of delays and cost overruns in past financing rounds. Third, the optimal research horizon increases from one stage to the next. Early stages should stop relatively rapidly because the chance for an overall success is remote. As more benchmarks are realized, the value of the project increases, and it becomes rational to persevere for longer. Fourth, benchmarking permits the use of implicit incentives comprised by the relational promise of future contingent financing rounds if earlier rounds are successfully completed. The promise of future information rents serves as a powerful incentive device in earlier stages, making the extension of the funding horizon in earlier stages cheaper. To summarize, the authors find that benchmarking allows the venture capitalists to better design the optimal funding profile for innovative projects, which in turn allows a more efficient research policy to be adopted.

2) "*The VC Fund's Limited Life Span As Source of Suboptimal Early Exits*" by Eugene Kandel, Dima Leshchinskii, Harry Yuklea.

This research paper presents a model that analyzes the agency and the information asymmetry problems that exist between general partners (GPs) and limited partners (LPs). The role of VCs as financial intermediaries creates agency and information asymmetry problems between the VC managers and entrepreneurs on one hand, as well as between the investors (LPs) and the VC managers as GPs on the other. The literature focuses mostly on the relations between the VC fund and the entrepreneur and pays much less attention to the conflict of interests between LPs and GPs in the VC fund itself. This is despite the fact that the highest claims in the project are held by LPs (typically 75-80% of the VC share in the project), which makes them bear the most cost of any inefficiency. This study considers two examples of such inefficiencies stemming from the LP/GP agency problem: suboptimal termination and continuation decisions made by GPs in the final years of their VC funds' life. This appears to be a highly relevant and considerable problem as data and industry sources for example suggest that in the "post dot-com" period the average number of discontinued projects almost doubled while around 50% of the terminated projects are supposed to be potentially "good" projects. Given the amount of funds committed by investors to this class of financial partnerships, this inefficiency translates into the annual loss of billions of dollars, most of which is born by the LPs.

The source of the problem in the model is the short horizon of the GP stemming from the finite life of the fund: LPs commit money for investment in risky projects, while the GP selects projects and provides unobservable advisory effort (monitoring) for each project. The GP privately observes projects' quality and the estimated time to exit and decides which projects to continue. It is shown that both selling unfinished projects at competitive ("fair") price and termination of all unfinished projects at the fund maturity create suboptimal outcomes: VC funds, in which a GP sell his stakes at a competitive price, tend to continue all poor quality projects, thus decreasing the overall quality of portfolio projects. VC funds, which have a practice of terminating all unfinished projects at its maturity, should have much higher portfolio quality, but this result comes at the cost of writing-off some good projects long before the fund maturity.

The problem studied stems from the GP's myopia induced by the finite life span of the VC, and by his superior information relative to other agents. The analysis presents several mechanisms to alleviate the problem. One possibility is to reduce the GP's stake in all unfinished projects, which would reduce his incentive to prolong bad projects, and, surprisingly, may indirectly increase his incentive to invest in "delay-prone" good projects. Another mechanism is to award post VC non-vested cash rights to GP. Yet another one is to co-invest with a much younger fund, which does not face the same limitations, but have the same information as the lead VC. Finally, the creation of brokerage institutions trading on VC portfolios (similar to trading of options on real assets) would reduce the information asymmetry at fund maturity.

3) "*Patent Defense Financing*" by Gerard Llobet and Javier Suarez.

The third research paper compares the impact of the different modes of financing for legal costs on the ability of patent holders to protect their inventions from infringes. As the value of an invention depends greatly on the ability of patent holders to protect their inventions

against imitators, the ability to obtain financing for the legal costs is a key determinant of the incentive for firms to innovate. In this research paper the authors provide a new theoretical insight into the appropriate design of patent litigation insurance (PLI) which would make it a superior instrument for financing patent defense in comparison with the resort to a financier once a patent infringement has occurred.

Towards this end, the authors consider the situation where a patent holder (the incumbent) faces the threat of infringement of her patent by a deep- pocketed rival and must decide how to source funding for litigating it. Initially, there is uncertainty on the strength of the patent, which is measured as the probability with which courts may rule against the rival, considering that his product violates the patent. The rival decides on entry and the incumbent on litigation after learning about the strength of the patent. If no entry occurs, the incumbent obtains some monopoly rents. If entry occurs and the incumbent does not litigate, or if she does but litigation fails, the market is shared by the two firms and the monopoly rents are lost. If the incumbent litigates and succeeds, the rents are kept. Litigation obliges to incur some legal costs in advance and, once the case is resolved, to compensate the opponent for his own costs, if he wins. The incumbent then has a choice between two alternatives for patent defense financing. One alternative is to resort to a financier once the infringement has occurred (ex-post-financing) and the other is PLI whereby, before entry occurs and in exchange for a premium, a financier (the insurer) commits to cover the litigation-related financial needs of the incumbent.

The authors show that in the case where ex-post financing is chosen, if the monopoly rents associated with the patent are small compared to the costs of defending it, the rival may decide to enter and infringe the patent simply because he correctly predicts that the incumbent will not litigate. This is the case of patent predation. In the opposite case where litigation costs are small, litigation will in fact occur. Relative to ex-post financing, a basic PLI policy provides the incumbent with an unconditional commitment to litigate. In the patent predation case, this commitment has a deterrence effect on the potential infringer, who will then only enter if the patent is weak enough for him to have good chances in court. The cost of this arrangement, however, is that entry is always followed by litigation, even if the net value of defending the patent is negative. So excessive litigation occurs and therefore there is no clear dominance of PLI over ex-post financing can be established. In the absence of patent predation, no additional deterrence effect can be achieved and then undertaking a basic PLI policy would simply imply paying, incorporated to its premium, the extra cost of wasteful litigation.

To remove the wasteful litigation that a basic PLI policy induces, the authors suggest a novel addition in the contract of PLI: the introduction of a deductible or co-payment in the arrangement, namely, leaving uncovered part of the litigation-related financial needs of the incumbent so as to make her (or her ex-post financiers) to internalize some of the costs of litigating. The authors show that with an appropriate deductible, PLI can implement the incumbent's second-best outcome: patent predation can be prevented without the cost of excessive litigation. This result has clear policy importance given that the European Union is considering the introduction of a compulsory PLI scheme. However the authors also conclude that obliging all innovators to subscribe to a standard policy may not be efficient since according to their analysis, the optimal value of the deductible and the associated premia depend on innovation-specific parameters. They suggest that governments should simply try to facilitate the existence of a competitive insurance market, which should be able to provide a PLI policy tailored to the characteristics of each innovator.

4) "*The Effect of Capital Market Characteristics on the Value of Start-Up Firms*" by Roman Inderst and Holger Müller.

This research paper seeks to analyze the effect of market characteristics, such as the expected return on investments, entry costs, and capital market transparency, on the relative supply and demand for capital and thus on the relative bargaining power of entrepreneurs and venture capitalists. Relative bargaining power, in turn, affects equity shares and incentives and hence on the success probability, value, and valuation of start-ups. A high valuation of start-ups increases the rewards to innovation and hence the rate of innovation.

To this end, the authors provide an equilibrium framework linking characteristics of the venture capital market and the success probability of new ventures. The relationship between the entrepreneur and the venture capitalist is modeled as a double-sided incentive problem: A greater fraction of the firm owned by the venture capitalist improves the venture capitalist's incentives but weakens the entrepreneur's incentives. Efficiency requires balancing the two incentive problems, or equivalently, balancing equity shares. Actual equity shares, however, are determined by bargaining, and thus by the relative strength of the entrepreneur's and venture capitalist's outside options. An increase in capital supply, for example, makes it easier for an entrepreneur to obtain financing, thereby increasing his outside option vis-à-vis a venture capitalist. The supply of capital, in turn, depends on primitive market characteristics such as the profitability of investments, entry costs, and capital market transparency. For example, an exogenous increase in investment profitability (due to e.g., a technological shock) leads to new entry and capital inflows, thereby tilting the (im) balance between capital supply and demand in favor of entrepreneurs. The outside option of entrepreneurs–and thus their bargaining power–increases, while the outside option of venture capitalists decreases. This affects the division of equity shares, and thus the incentives and value creation in start-ups. If the imbalance between capital supply and demand is strong, the value created in start-ups is relatively low. Such inefficiencies may arise even if there is free entry of capital. As an individual venture capitalist entering the market does not take into account the effect of her entry on the overall level of capital supply, entry involves an externality.

Their model is able to provide a useful understanding of what happens during the Internet boom and bust periods. As winners often tend to materialize quicker than losers (poor performers may be able to hold out until their cash is finally burned up), the initial success stories at the beginning of the Internet boom period might not have been representative of the industry as a whole. The general public and investors might have thus overestimated the true returns to Internet investments. As more and more firms began to fail, investors realized that their initial assessment was wrong. They consequently adjusted their return estimates downward. In their model, boom and bust of the Internet correspond to an increase and decrease, respectively, in the perceived returns to venture capital investments.
The authors also find that that an increase in transparency improves the value created in start-ups, while a decrease in entry costs may destroy value if the aggregate capital supply is already at a high level. Finally, capital market competition not only affects the incentives after, but also prior to the formation of a new venture. They show that venture capitalists are more likely to screen projects in "down markets" when competition among investors is weak, and less likely in "hot markets" when competition is strong. The authors conclude that policy measures affecting the supply of capital or competitiveness of the venture capital market can then improve welfare.

C. Policy-Relevant Conclusions of research in Theme 2

This section provides a brief summary of policy implications that are a consequence of or directly related to the research carried out under Theme 2 of the project. This summary is organized along the main lines of policy initiatives or avenues of institutional, legal and fiscal framework set by public policy that are discussed in the Risk Capital Action Plan (RCAP) of the European Community.

Legal environment: investor protection, prudential rules to allow investors to invest in venture capital

The research by Inderst and Müller provides some clues on policy decisions that affect the evolution of market conditions. For example, they show that policies encouraging investor dispersion and risk taking must take into account the possibility of cyclical over investment in risk capital.

Corporate Governance rules

In the work by Inderst and Münnich, it is shown that the option for venture capitalists to credibly impose budgeting constraints can be beneficial as it helps to overcome agency problems in venture funding, for example excessive spending that has become so devastating in the internet bubble period. Corporate governance policies safeguarding the control leverage of VCs over their portfolio companies are an important vector to ensure that VCs can impose tight budgets if this is efficient. The work by Swoboda confirms that giving active shareholders the ability to influence corporate decision-making positively affect firms' investment behavior and alleviates moral hazard problems.

Accounting and disclosure requirements

This policy topic has already been explored under Theme 1 of the project. Under Theme 2, Inderst and Müller show how and when market transparency can increase the value create by innovative companies. The analysis done in Kandel, Leshchinskii and Yuklea shows that the requirement of benchmark reporting from GPs to LPs with estimations of the project duration improves the continuation decisions of VC investors. Similar effects might be achieved by removing the investment limitations of VC-fund contracts but to allow investment at any point of life-time as well as by encouraging the use of call and put options between GPs and LPs. The creation of certification institutions like brokerage trading on VC's portfolios may reduce the inefficiency arising form information asymmetry, thus allowing the operation of an efficient secondary market.

Initiatives for the creation of high-growth stock markets

Neus and Walz show that the optimal disinvestment decision of venture capitalists is a highly differentiated process. Experienced and highly specialized VCs with high active skills in monitoring and advising should optimally exit late, while more passive VCs with little

industry expertise should exit early. This has direct policy implication for the regulation of lock-up periods on high-growth stock markets. So far, they tend to be uniform for issuers and large blockholders (including VCs). This paper suggests that a differentiated menu of aftermarket exit regulations will improve the going public process for innovative firms. The paper by Arcot generally shows that the ability of intermediaries (such as analysts and investment banks) to reduce informational asymmetries in these stock markets is an important determinant of successful innovation finance and entrepreneurial activities.

Public venture funding and public subsidies for risk capital

Whether public venture funding is sufficiently effective to be a risk capital policy priority is one topic on public funding, which we started to address in Theme 1 of the project. Another topic, that is addressed here, is to investigate optimal policy conditional on public subsidies being provided: which policy measures in the implementation of such programs, and institutional features surrounding public venture funds determine relative success and failure? Di Giacomo undertakes a detailed analysis of the lessons from public funding initiatives across the spectrum of European countries with such programs. She distils a list of key success drivers, among them the independence and professionalism of public fund managers, co-financing by private funds, clear investment guidelines on investment targets and policies. The paper by Hirsch similarly looks at the effect of a diverse set of direct policy measures on the structure of financing contracts. These structures are very important to enable the successful creation and development of innovative firms, as the various and maybe conflicting interests, have to be considered. The results show that many well-meant measures have countervailing effects that hinder the successful financing of young firms. This is particularly the case for guarantee programs and initial financing subsidies. Success-dependent measures like ex ante grants or in the form of tax breaks offer much more robust support to innovative firms' financing and development.

Corporate and income taxation policies

The research by Inderst and Müller discusses how policy measures having an impact on the supply of risk capital, among them prominently capital gains taxation, corporate tax exemption on R&D spending, and income tax incentives, have a more complicated impact in the financing of innovation than commonly thought. In volatile market setting that lend themselves to booms and busts, oversupply of risk capital can occur and time-varying tax policy can play an important role of stabilizers. The paper by Hirsch argues in the same direction, highlighting the difficulties some measures create due to the complexity of incentive structures between financiers and entrepreneurs. Tax incentives focusing on successful portfolio companies in later stages seem to be preferable, as they do not destroy efficient contractual structures.

Patent system and intellectual property rights

The paper by Llobet and Suarez considers the choice between patent liability insurance or ex post patent defense financing. This discussion has clear policy relevance in light of the current EU discussion on mandatory patent defense insurance. The policy implication is that an across-the-board mandatory coverage scheme is not optimal, since the optimal design of the insurance contract (deductible, premium) must take innovations-specific characteristics into account.

4) CONCLUSIONS AND POLICY IMPLICATIONS

This section contains the analytical and policy substance of the RICAFE research network's efforts. It summarizes the central findings and suggestions. The aim of this report is to provide policy-makers with a comprehensive, compact map to evaluate the risk capital market and its ability to provide financing to entrepreneurial firms. Reference to the underlying research paper is also provided for those interested in pursuing certain results in more detail.

A. Summary

We have produced an extensive analysis of the relationship of risk capital and the financing of innovative, entrepreneurial firms with specific focus to aspects relevant for the European market. In this part of the Report we summarize the main findings of our research papers in a coherent and accessible way. Specifically, we highlight the most important issues in the value-chain of risk capital financing and covers the crucial topics in the development of commercially successful firms from initial funding to the exit of risk capital financiers. We relate the various findings to aspects, which are of specific relevance to public policy makers aiming to foster the financing and development of innovative firms in Europe. We conclude with an extensive discussion of various policy issues.

1) *Determinants of successful financing and development of innovative firms*. We provide an in-depth analysis of a large set of empirical results on the factors, which positively affect the success of risk capital investments and the financing of innovative firms. We show the influence of legal structures, taxation, organizational structures and characteristics of financiers on the ability to channel funds to promising new firms and to influence their successful development.

2) *The role of exit opportunities*. Here we address one of the crucial determinants of successful venture financing: the ability of investors to exit their investments. Financiers and entrepreneurs use various contractual structures with a direct effect on the anticipated exit in later stages of their relationship. These structures enable the contracting parties to establish contingent payoff and control structures, which ensure the ongoing preservation of incentives and the provision of efforts. Initial public offerings are the most profitable exit channel, and the report addresses various issues concerning the efficient functioning of this process, including book-building processes, lock-up regulations and the role of investment banks and financial analysts.

3) Contractual *structures in innovation financing*. We provide an in-depth analysis on the workings of risk capital financing. Several important aspects are discussed with regard to contractual structures and non-contractual instruments used by venture capital investors. Additionally, the report covers the role of financing in shaping incentives fostering the development of firms after initial funding has been provided. In a third step, the role of public policies is assessed with respect to its influence on the complex relationships in innovation financing. Several specific policy means are assessed, with both positive and negative effects of public policy being identifiable.

4) *The relationship between limited and general partners in VC funds*. We discuss the provision of funds by investors to specialized intermediaries (venture capital and private equity funds), which channel capital to innovative firms. We discuss those aspects of governance of funds and agency problems, which are relevant for the successful development of an investor base in the asset class of risk capital investments. Several institutional and regulatory means are identified to foster this development.

5) *Financing the protection of intellectual property*. We link corporate financing and financial instruments with the ability of firms to protect the rents arising from their innovation activities. Specifically, we analyze the instrument of patent litigation insurance, providing insight and policy recommendations, which efficiently support the activities of innovative firms.

6) *The European market for risk capital in international comparison*. We provide an overview of major differences between the European market for risk capital and the US market. We discuss both differences in the sources and supply of funds towards venture capital and differences with respect to performance and abilities of the respective market participants. In sum, several differences still persist and suggest the need of the European market to develop further.

The final three topics deal specifically with recommendations about public policies and support of risk capital financing and innovative firms.

7) *Regulatory frameworks and conditions favoring risk capital financing*. Our analysis covers an extensive set of factors, which our research identified to be highly relevant for successful risk capital financing. Although these factors affect the risk capital market mostly indirectly, they seem to offer the most promising means for public policy aiming for higher risk capital financing and the creation of new firms in Europe. Policy recommendations are derived for the regulation of pension funds, accounting and capital markets, for corporate governance and the legal environment and for the taxation of capital gains.

8) *Public policy for risk capital*. We argue in favor of the structuring of non-grant support. While public interventions appeared to be supportive of the early development of the European risk capital market, we caution against the undifferentiated use of direct support and provision of funds. Several requirements are presented which public interventions should fulfill.

9) *Public policy for entrepreneurial firms*. We finally discuss alternative means to directly support innovative activities and the creation of new firms. These cover protection of intellectual property, regulations affecting the creation of new businesses and support for innovations via regional innovation clusters and the promotion of R&D activities.

B. Analysis

1. Determinants of successful financing and development of innovative firms

Beyond documenting the structure of the flow of funds to European innovative firms, our first goal has been to analyse various aspects in regulatory and legal frameworks, which affect the success of risk capital financings. The analysis has point to key empirical findings on the ability of different types of VC investors to successfully finance young innovative firms and turn them into commercially successful businesses. The issues relevant to the general framework have been addressed within both Theme 1 and 2.

1.1 Legal and regulatory frameworks determining successful risk capital financing

The study by Da Rin, Nicodano and Sembenelli on "Public Policy and the Creation of Active Venture Capital Markets" offers both theoretical considerations and empirical findings on the relative attractiveness of investments into innovative firms in European countries. As one of the main financing problems for such firms is the low ability to pledge collateral, both risks and returns of invested capital are higher. Hence, investors (as well as innovative entrepreneurs) have to be able to reap benefits from their efforts. The study shows that various direct and indirect measures raise the attractiveness of an engagement in innovative firms: Among the direct measures, lower tax rates on capital gains as well as the existence of stock markets for entrepreneurial firms matter, while the provision of funds does not turn out to be as important in Europe. Indirectly, barriers to entrepreneurship raise the cost of creating new businesses: the empirical analysis shows how stricter labor market regulations and regulatory requirements and processes hinder investments into innovative firms. Similar observations are made in the research paper by Cumming, Schmidt and Walz; their international comparisons reveal that legal structures impeding the due diligence process of investors slow down the screening process. This reduces the rate of investment and the ability of a fund to properly manage deal flow and the financing of meritorious entrepreneurial firms. As another study of the network shows, it is exactly the timing ability, which is most relevant for the return of VC investments into young firms (see the paper by Schmidt, Nowak and Knigge on market timing and the performance of risk capital). Overall, these findings offer several approaches for policy makers wishing to improve the chances of innovative firms to receive financing.

Given the need of investors to balance various aspects in their relationship to innovative portfolio firms, a closer analysis on the effects of legal structures is necessary. This is done within the micro-level analysis of the European markets undertaken by Bottazzi, Da Rin and Hellmann ("What Role of Legal Systems in Corporate Governance and Contracting? Theory and Evidence from Venture Capital"). Europe lends itself, as an excellent object to examine differences across legal systems because member countries are reasonably comparable in their stages of economic growth, yet within, there is a rich variety of legal systems. Similar to the arguments presented above, under better legal protection, investors are expected to exercise more governance, give more non-contractible support, and demand more downside protection by using securities such as debt, convertible debt, or preferred equity. Moreover, investors in better legal systems have stronger incentives to develop the competencies necessary to provide governance and value-adding support. These effects are empirically confirmed looking at different aspects of a legal systems: common (as opposed to civil) law, higher quality of enforcement of rules and the degree of formalism of a legal system all

positively affect the relation between VCs and the entrepreneurial firms they invest in, not only by determining the contractual structures in use but also by affecting the incentives for value-enhancing activities.

1.2 The ability of VCs to successfully finance innovative firms

It is one thing to improve the chances of entrepreneurial firms to receive risk capital financing. But it is another thing what determines the successful development of these firms. If risk capital financing merely meant the allocation of funds to promising companies, then provision of capital could be ensured via channels different from private VCs (such as public funds or banks). If, however, hands-on involvement and value-enhancing activities of investors were needed, then investment decisions should be undertaken by those investors most able to provide services such as monitoring, advice and support services or management and strategic support. The studies conducted under the topic "The Determinants of Venture Capital and Other Forms of Risk Capital Targeted to Innovative Firms", considerably strengthen the literature's suggestion that active VC investors are a key ingredient to successful firm development.

The empirical analysis and international comparison of VC investment returns shows that higher direct VC involvement in monitoring and advice significantly increases the investment returns. Similarly, indirect involvement via control and incentive compatible instruments (particularly via convertible securities) contributes to a significant increase of returns. Finally, the analysis again highlights the importance of the legal and regulatory environment for investment returns, stressing again findings in other analyses undertaken within the research network.

The research network's effort goes beyond the finding that active VC investors are highly relevant for the success of innovative firms. The study by Cumming, Schmidt and Walz as well as particularly the work of Bottazzi, Da Rin and Hellmann on "Active Financial Intermediation: Evidence on the Role of Organizational Specialization and Human Capital" finds determinants of such beneficial involvement by VCs. The former study stresses the importance of legality. Better legal structures strengthen the interaction between VCs and their portfolio firms: they facilitate board representation of the investor (control and corporate governance effect) and reduce the probability that the investor requires periodic cash flows (effect on cash flow rights). The work by Bottazzi, Da Rin and Hellmann explicitly looks at characteristics of VC firms and individual partners, thus providing a link between organizational structures and active involvement of VCs.

The results of our research suggest that organizational specialization of VC firms positively affects the activity of VCs with respect to portfolio firms. VCs that are independent – that is are able to formulate their investment strategies themselves – are more profit-driven and have stronger incentives to provide effort. VCs specialized on the financing of innovative firms (venture capital as opposed to buyouts) are also more actively involved with investees, as are firms with a lower number of deals per partner. On the other hand, bank-dependent and public VCs show the lowest involvement in their portfolio companies. As a new determinant of active VC involvement not considered in the earlier literature, the study finds that the human capital of individual VC partners matters greatly. Prior business experience or scientific education of these partners positively affects VC involvement, with human capital and organizational specialization reinforcing each other. This confirms what is

generally confirmed by practitioners and what used to be almost ignored in academic research: human capital and individual skills and backgrounds of VC partners affect the behavior of VCs. Overall, these findings emphasize the role of VCs as intermediaries which goes beyond the pure provision of capital: processing of soft information and interaction with portfolio firms are key inputs of VC financing. This also explains why dependent VCs might not be as successful as private VCs: human capital, organizational structures and general inventive structures have to be set properly for successful risk capital financing.

Another indication that private VCs possess superior abilities to create successful firms out of risky, innovative enterprises stems from the empirical analysis "Are IPOs of Different VCs Different?" by Tykvova and Walz on the role of public stock markets. The comparison of stock market returns after the IPO of new firms reveals that the backing of firms by different financiers significantly affected longer term success (as measured by risk and return on a company's stock). Firms backed by independent VCs perform significantly better two years after the IPO as compared to all other IPOs, and their share prices fluctuate less than those of their counterparts in this period of time. Thus, independent VCs, who concentrated mainly on growth stocks (low book-to-market ratio) and large firms (high market value) were able to add value by achieving a lower post-IPO idiosyncratic risk and a higher return. On the contrary, firms backed by public VCs (being small and having high book-to-market ratios) showed relative underperformance. Overall, different corporate governance structures, experience levels, and objectives among VCs have observable and significant impact on the portfolio firms' performance. These findings imply that different types of VCs fulfill their overall task as specialized monitors, consultants, and financiers of young innovative firms in quite different ways.

With respect to the development and investment activities of firms beyond the first stages of their financing, the empirical work by Swoboda on "Cash Flow-Investment Sensitivities of European Companies in the 1990s" considers how innovative and established firms differ in their behavior. In spite of the better analyst coverage and the presumably more efficient capital markets for large caps, the information barrier between investors and management seems to be higher for larger firms. This may be caused by a closer relationship between management and shareholders of the smaller growth companies. The data also indicates that growth companies with little cash generally rely on debt capital as their predominant source of finance and not on cash flow when it comes to investment. Overall, the analysis suggests that block shareholders have a positive impact on investment behavior. These findings highlight again the important role VCs (as initial providers of equity and major investors) play in influencing the behavior of the firms they invest in. Adequate corporate governance regulation and legal enforcement mechanisms are key for these financiers to fulfill their role.

2. Contractual structures in innovation financing

Venture funds are the main source of financing for innovative projects. Therefore, the effectiveness with which the VC industry is able to channel funds into financing innovative projects will have an important impact on the creation of successful innovative companies and hence on the rate of innovation of an economy. The ability of VC firms to finance more projects depends naturally on their profitability and their ability to overcome agency costs, which in turn depend on their mode of operation. To evaluate the efficiency of risk capital financing and potential public support to private initiatives, it is indispensable to develop an understanding of the mode of operation of the venture capital (VC) firms/industry and its

impact on innovation. The analysis around Theme 2 on the links between risk capital, innovation and successful entrepreneurial development adds considerably to the understanding of the structures and operations within the VC industry.

2.1 The influence of financing on innovative activity

In order to overcome agency problems arising out of risk capital financing, the VC industry has developed an extensive set of contractual and non-contractual means. Substantial effort of the research network has been devoted to analyze the various structures, which allow financiers to profitably provide financial support and at the same time ensure commercially successful development of enterprises out of new scientific and technological advances. For example, the paper by Anderson and Nyborg on "Financing and Corporate Growth under Repeated Moral Hazard" considers the effect of financing on the development of a company from an initial idea to an established business. Specifically, the authors examine the implications of financial contracts for the growth of the firm both at initial stages when the product idea is developed by an entrepreneur and at later stages when the firm can take its operations to a higher, more profitable level but needs experienced (outside) managers to run the operations. In comparing the growth implications of debt versus equity, it turns out that debt promotes the creation of growth opportunities, possibly at the expense of efficiency once the firm is up and running. The reason is that debt encourages an entrepreneur to do R&D in the first place. In contrast, equity promotes the implementation of improvements, possibly at the expense of the creation of growth opportunities. In sum, debt favors first stage growth; equity favors second stage growth. In order to be able to balance these different aspects optimally, financiers have to be able to choose the right structure of finance as independently as possible.

Often complex contractual structures are used to overcome agency problems between VCs and entrepreneurial firms. The work by Inderst and Müller ("The Effect of Capital Market Characteristics on the Value of Start-Up Firms") complements the previous analyses by studying the link between capital market characteristics (such as profitability, transparency, or entry cost), financing, contracting relationships and innovative behavior. The structure of capital markets affects the relation between supply of and demand for risk capital and thus the relative bargaining power of entrepreneurs and VCs. The relative market powers in turn determine the share of payoffs between the participants, thus affecting the distribution of incentives and in the end the success probability and value of firms created out of innovative activities. If the imbalance between capital supply and demand is strong in either direction, the value created in start-ups is relatively low. This kind of inefficiency may arise even if there is free entry of capital. The analysis predicts that an increase in transparency improves the value created in start-ups, while a decrease in entry cost can destroy value if the aggregate capital supply is already relatively high. Finally, capital market competition affects the incentives not only after but also prior to the formation of a new venture. The authors conclude that policy measures affecting the supply of capital or competitiveness of the venture capital market can improve welfare. These results point out that the supply of new (public) funds may have negative effects on innovation and the successful creation of entrepreneurial firms when competition for good projects is high. In these kinds of market situations, R&D incentives appear to be more preferable policy measures.

2.2 Financing and successful business development

The paper by Bergemann and Hege on "The value of benchmarking" addresses an issue critical for the success of innovative activities and efficient financing of these: VCs may use benchmarks when deciding about the optimal allocation of funds at various stages of an innovative firm's development process. These structures appear to be particularly helpful when founders of entrepreneurial firms are required to provide effort in the ongoing development of innovations, and at the same time enable VCs to improve continuation decisions. The authors explicitly study a dynamic framework and the optimal staging and benchmarking policy in the presence of agency problems concerning research intensity, research lay-out and research budgets.

When VCs are able to use benchmarks, the authors find that agency costs can be considerably reduced and the research horizon of projects extended through four channels. First, since the project is abandoned once a benchmark is not met within its pre-defined horizon, the information rent of the entrepreneur is dramatically reduced. Second, benchmarking makes it possible to define optimal and inter-temporally consistent research budgets (research horizons) for every single stage. An important advantage is that these budgets will be independent of the history of delays and cost overruns in past financing rounds. Third, the optimal research horizon increases from one stage to the next. Finally, benchmarking permits the use of implicit incentives containing the promise of future contingent financing rounds if earlier rounds are successfully completed. The promise of future information rents serves as a powerful incentive device in earlier stages, making the extension of the funding horizon in earlier stages cheaper.

Many contractual structures used in VC financings are closely related to the choice and profitability of future exits. These will be discussed in the following section. However, also non-contractual means are used to overcome agency problems and ensure the successful development of young firms. Within the analyses of exit decisions, Inderst and Münnich ("The Benefits of Shallow Pockets") show that the option for venture capitalists to credibly impose budgeting constraints can be beneficial as it helps to overcome agency problems in venture funding. This self-constraining mechanism gives entrepreneurs the adequate incentives to continuously invest in their business even after initial funding has been secured. One can indeed observe that VCs thus render additional fund-raising at a later life-cycle stage of a fund difficult. So-called "down rounds", in which the worst performing start-ups must raise additional funds at reduced valuations from outside investors also confirm the use of this non-contractual structure. Corporate governance policies for VC funds, which enable VCs to keep to this pre-commitment and to impose tight budgets on portfolio firms, need to be enforceable. Thus, potential guarantees of funds by policy programs might undermine such a commitment and render the ongoing development of innovative firms more difficult.

2,3 The choice of public incentives

There is a wide consensus that SMEs and young developing firms are able to generate positive externalities (spillovers), creating new jobs, new ideas and new abilities, which other industries and the whole economy may enjoy (the most documented form of these spillovers arise from R&D). However, when social returns exceed private returns, firms tend to under invest or, more generally, too few investments in innovative firms emerge in the

economy. The topic "Public Incentives for Venture Capital and Their Effect on the Development of Commercially Useful Innovations", and in particular the paper by Hirsch ("Public Policy and Venture Capital Financed Innovation: A Contract Design Approach"), analyze the ability of a set of public policy programs in the presence of spillovers. The public policies analyzed are guarantee programs, all forms of subsidies, technical assistance for venture capitalists, the offer of access to networks and public private partnerships, all being observed in different countries. These measures generally share the aim of promoting the development of innovative firms by improving their ability to be financed.

The analysis by Hirsch is done within a framework of multiple agency problems, which are usually solved via the complex contractual structures observed in reality. Given the important role of contractual structures, it is essential that an evaluation of public policy measures take into account their influence on contract design. The results show that some public policy programs observable in Europe may not satisfy their purpose: given the complexity of contractual structure in the financing of entrepreneurial firms, public policy has to take into account its effects on these structures. Failure to do so results in a general reduction in welfare. Overall, one can conclude that guarantee programs and ex ante grants are doubtful policy measures as they can destroy contracting mechanisms, particularly in more developed markets where participants are more experienced in evaluating innovative projects. Public private partnerships are helpful in the case of spillover effects that are independent of a project's innovative value and public support is useful in a developed market with spillovers dependent on this innovative value. However, ex post grants are the most robust and therefore the most suitable instrument as they guarantee the first-best solution independently of the scenario and the market situation. Consequently, public intervention in the VC market should be adequately and carefully designed in order to enable VCs and entrepreneurs to overcome existing conflicts of interest.

3. The role of exit opportunities

The profitability of risk capital investments – and hence the incentives for private investors to provide this financing – depends to a large extent on the gains realized in exits. On the other hand, the type of exit (or the expectations thereof) is also relevant for the entrepreneur of the financed firm as it affects his future payoff and connection to the firm. Several structures in the relation of financiers and entrepreneurs are specifically tailored to balance the various interests and incentives concerning the end of the original financing relationship. Several papers of the research network, specifically those in the aforementioned two topics, address the structure of problems and solutions arising out of exit considerations.

3.1 The relationship between exits and the success of innovative firms

The two exit channels most important to VC financing are IPOs and trade sales. The paper by Bienz on "A pecking order of venture capital exits – What determines the optimal exit channel for venture capital backed ventures?" shows how each channel differs in its allocation of issuing proceeds and its provision of incentives: in a trade sale, usually the whole firm is sold to an outside investor, namely (larger) corporations who usually replaces the founding entrepreneurs; in an IPO, the founders do not completely sell their shares. The analysis thus highlights the role of post-IPO corporate governance issues that might affect the optimal decision to go public. In very successful firms the entrepreneur's equity stake in

the venture assures incentive compatibility and thus limits redistribution from the VC to the entrepreneur. Hence, the exit decision includes the decision about the extent of the realignment of ownership and control.

The analysis by Arcot on "Participating Convertible Preferred Stock in Venture Capital Exits", attributes the use of the specific contractual form of Participating Convertible Preferred securities (PCPs) to the need of VCs to signal the quality of their investment to outside investors during an IPO who do not have perfect information about a firm's quality – as opposed to informed industrial buyers in a trade sale. The analysis not only shows how the contractual structure of PCPs raises the probability of IPOs per se, but it also improves the incentives for entrepreneurs to provide effort during the development of the business. Hence, PCPs also ensure that the innovation activities of the entrepreneur – being crucial to the success of the new business – are sufficiently rewarded. The paper is then able to derive a link between IPO activity and financial market development via the specific contractual structure: Less developed financial markets with correspondingly higher asymmetric information between industrial and market investors deter VCs from IPOs as exit routes because the costs of signaling are too high. Consequently, a well-developed structure of financial intermediaries (such as analysts and investment banks) with the capacity to reduce informational asymmetries affects positively the sale of high-quality firms in IPOs – which in turn is a pre-requisite for entrepreneurial effort and the creation of successful new businesses.

3.2 IPOs and the role of stock markets for entrepreneurial firms

Given the importance of IPOs as the most profitable form of exits, Neus and Walz ("Exit Timing of Venture Capitalists in the Course of an Initial Public Offering" consider the disinvestment strategy of VC firms at IPOs. Two effects interact in determining the optimal strategy in an IPO. First, reputation allows VCs to overcome the costs associated with informational asymmetries in the equity market. Second, financiers may decide to extend their financial involvement in order to invest in the quality of portfolio firms via advisory services and management support for an additional period. As a result, experienced and highly specialized VCs with high active skills in monitoring and advising should optimally exit late, while more passive VCs with little industry expertise should exit early. Different types of VC investors (with respect to monitoring abilities, experience, investment focus or reputation) will thus choose differentiated disinvestment structures. This has direct policy implication for the regulation of lock-up periods on high-growth stock markets. So far, they tend to be uniform for issuers and large block holders such as VCs. This paper suggests that a differentiated menu of aftermarket exit regulations will improve the going public process for innovative firms.

While IPOs are the most profitable and attractive type of exit for VCs, the process involves informational asymmetries and involves a very specific type of cost for the VC: underpricing of shares at the initial floatation. IPOs are usually observed to have significant (excess) returns between the floatation price and the first quote on the stock market. Hence, VCs forego profits by selling at lower levels than the first market valuation. The extent and reasons for these costs are analyzed in the papers by Franzke ("Underpricing of venture-backed and non-venture-backed IPOs: Germany's Neuer Markt") and by Ellul and Pagano ("IPO Underpricing and after-market liquidity"). The paper by Franzke analyzes the pricing of the stock of listings on the German "Neuer Markt", asking whether VC backed IPOs

differ in the extent of underpricing. Contrary to other studies, however, VC backed IPOs did not appear to show lower underpricing than non-VC backed IPOs. The analysis clearly raises the question why this was the case.

The analysis by Ellul and Pagano expands the traditional explanations of underpricing by linking underpricing to after-market liquidity and liquidity risk. They argue that an IPO that is expected to be less liquid and to have higher liquidity risk should feature higher underpricing. The empirical analysis confirms that expected after-market liquidity and liquidity risk are important determinants of IPO underpricing, even after controlling for other variables suggested by other theories of IPOs (e.g. variables capturing asymmetric information and fundamental risk). Their results are novel for two reasons. First, they highlight an important and neglected link between market microstructure and corporate finance: secondary market liquidity affects the cost of equity capital for companies that choose to go public, and may even affect that very choice. Second, they document that investors not only price the expected level of liquidity but also liquidity risk – and that the latter possibly matters to investors even more than liquidity itself.

Finally, the paper by Degeorge, Derrien and Womack on "Quid Pro Quo in IPOs: Why Book-building is Dominating Auctions" examines the important question of whether financial analysts help to improve the access of innovative firms to the private equity market. Information asymmetry between investors and a seller potentially leads to an undersupply of funds to innovative businesses. Sell-side financial analysts can potentially play an important role in bridging the information gap. However, one would expect that since financial analysts are often associated with investment banks' corporate finance operations, they would be under pressure to provide positive coverage of the companies taken public by their employers. This influence would be consistent with the notion that financial analysts are subject to a conflict of interest and cannot be trusted by outside investors. The authors find empirical evidence that underwriters employing the book-building process in IPOs implicitly commit to providing more favorable coverage to the companies they take public in the aftermarket. Specifically, they find that analysts affiliated with the lead underwriter of the offering issue more (and more favorable) recommendations for recent book-built IPOs than for auctioned offerings. An obvious policy implication is that financial analysts cannot play their role in information provision unless there is a separation of financial analysts from underwriting companies.

4. The relationship between limited and general partners in venture capital funds

The value-chain of risk capital financing starts with the provision of funds by investors (limited partners, LPs) to financial intermediaries (general partners, GPs), which operate private equity or VC funds. In this section we look at issues arising out of the relationship between these two partners.

4.1 The role of investors in venture capital funds

Looking at the structure and development of capital invested in the private equity asset class reveals a very heterogeneous structure in Europe. The paper by Arcot and Bruno on "Venture Capital in Europe: Facts and Issues" for example shows that the spread of these investments as a percentage of GDP ranges from as low as 0.01% to 0.63%, with a European average of 0.28%. At least as notable as this is the source of funds, which reveals that

pension funds – being considered the most specialized and professional investors in VC – do hardly play a role as important as in the most developed market in the US. It is only in the UK, that this class of investors plays an equally important role. In many other EU markets, banks and corporate investors provide a significant proportion of capital.

The research network's analyses within Theme 1 highlight several aspects, which have strong influence on the relationship between limited and general partners in risk capital financing. First, financial reporting of returns is critical for both investors (as they need to regularly assess and report their own financial situation) and VCs (as they aim to raise follow-on funds for new investments). However, an important element of reported returns stems from yet unexited investments, which are hard to evaluate. General partners have strong incentives to over-report on these returns when their reputation is low and follow-on fund raising important. The study by Cumming and Walz on "Private Equity Returns and Disclosure around the World" (aiming to identify relevant regulatory structures) addresses this issue empirically. Its findings confirm that especially young VCs as well as those being engaged in early stage investments are more eager to over-report. Maybe more importantly, there appears to be a very robust and significant impact of accounting standards and legal frameworks on the reporting behavior of VCs: Less stringent accounting rules and weak legal systems clearly seem to facilitate overvaluation thereby decreasing the informativeness of these valuations. These findings clearly call for the use of stringent accounting standards and disclosure rules. Distorted information between investors and VCs is an important obstacle to the flow of funds into this asset class. Similarly, if an over-reporting strategy is successful with respect to fundraising, the allocation of capital across VC funds can be severely distorted.

The second aspects concerns the issue of co-investments which often reflects an agency problem vis-à-vis the institutional investors if one VC fund is using capital to bail out the bad investments of another VC fund within the same VC organizational structure. The paper by Cumming, Schmidt and Walz on "Legality and Venture Governance around the World" analyzes (among other issues) this behavior. Similarly to the analysis of over-reporting, the international comparison reveals that successful legal and institutional structures facilitate syndication relations and inhibit co-investment by VCs. This again highlights the role of legal and regulatory frameworks pertaining to investing, the quality and likelihood of enforcement. Section 2 of this report will provide details on these frameworks and the key ingredients identified by the project.

4.2 Agency problems between limited and general partners

The flow of investors' capital into risk capital investments depends of course on the returns, which this asset class offers. What is needed furthermore is a sophisticated investor base which is able to understand the risk-return-profile of VC investments and which has to be enabled and incentivized to exert control over the use of funds. The investment in VC-funds is associated with a high degree of information asymmetry. Monitoring the prospects and understanding the business of each individual investment done by the fund is extraordinary difficult for single investors. Consequently, the venture capitalist has many opportunities to behave opportunistic and to take advantage of the delegated power. These potential conflicts have to be addressed in the partnership agreements between the general partner and limited partners. The topics *"An assessment of European venture capital"* and *"Financing, contracting, intellectual property rights and firms' innovative strategies"* contain the

relevant analyses relating to the investment process in VC and the contractual relations between VC funds and fund investors.

The paper by Schmidt and Wahrenburg on “Contractual Relations between European VC-Funds and Investors: the Impact of Reputation and Bargaining Power on Contractual Design” analyzes empirically the structure of partnership agreements in Europe. The aim is to identify the factors that influence the design of financing contracts between venture capital investors and European venture capital funds and to relate them to other studies’ findings about the US market. Contractual key elements are specified covenants, which restrict the venture capitalists from opportunistic behavior and compensation terms. In respect to compensation, the analysis refers to the management fee, the carried interest and its call option value, the hurdle rate, and the fund managers’ obligation to make their own capital contribution.

Our empirical analysis in unveils some surprising effects: Contrary to theoretical reasoning and US experiences, VC reputation seems to aggravate the incentive conflict between investors and managers in Europe, thus increasing the need for higher contractual restrictiveness. Furthermore, there seem to be signs of overconfidence: in times of growing VC funds, managers seem to prefer higher performance-related compensation and lower fixed payments. They renounce from using their negotiation power to increase guaranteed payments over the whole funds’ life but rely more on own future performance. This reveals significant differences between the European and the US market: Changing inherent incentives for fund managers with or without reputation are adjusted in the US by changing monetary incentives and in Europe by changing contractual restrictiveness. In Europe, the supply/demand situation for VC-services influences the management compensation but not the number of covenants. In the US, the contractual restrictiveness is weaker when supply of venture capital increases. It is yet unclear whether the European situation will change with the maturing of the VC market and a stronger professionalization of investors.

A specific agency problem between LPs and GPs arises from informational asymmetries between the two parties about the value of financed projects during the lifetime of a fund and particularly at fund maturity. The work by Kandel, Leshchinskii and Yuklea (“The VC Fund's Limited Life Span As Source of Suboptimal Early Exits”) address this issue, focusing on the relationship between limited and general partners of a VC fund and its effects on the successful development of entrepreneurial firms. Specifically, the model looks at two examples of inefficiencies stemming from LP/GP agency problems: suboptimal termination and continuation decisions made by GPs in the final years of their VC fund’s life. Anecdotal evidence suggests that these inefficiencies are highly relevant: industry sources for example suggest that in the “post dot-com” period the average number of discontinued projects almost doubled while around 50% of the terminated projects are supposed to be potentially “good” projects. The authors show that both selling unfinished projects at competitive (”fair”) price and termination of all unfinished projects at fund maturity (two observable policies) create suboptimal outcomes. Selling stakes at competitive prices leads to continuation of poor projects, thus decreasing the overall quality of a portfolio and misallocating funds. VC funds, which have a practice of terminating all unfinished projects at maturity, might have higher portfolio quality, but this result comes at the cost of writing off some good projects before the fund matures.

Our theoretical analysis of presents several mechanisms to alleviate suboptimal termination or continuation decisions by a GP. One possibility is to reduce the GP’s stake in all

unfinished projects, which would reduce his incentive to prolong bad projects and may indirectly increase his incentive to invest in "delay-prone" but promising projects. Another mechanism is to award post VC non-vested cash flow rights to GPs. Yet another one is to co-invest with a much younger fund, which does not face the same limitations, but has the same information as the lead VC. Finally, the creation of brokerage institutions trading on VC portfolios (similar to trading of options on real assets) would reduce the information asymmetry at fund maturity.

5. Financing and the protection of intellectual property

Innovative activity and its results are known to need legal protection for entrepreneurs to be able to reap the benefits of their costs incurred in earlier stages. However, even with existing patent protection, small firms in particular might be deterred from innovative activities in the first place when they expect not to be able to finance the defense of their patents in courts. The work by Llobet and Suarez on "Patent Defense Financing" explicitly addresses this issue and provides an important link between structures of financing and the ability of innovative firms to protect their patents on inventions in case of patent infringements. As the value of an invention depends greatly on the ability of patent holders to protect their inventions against imitators, the ability to obtain financing for the legal costs is a key determinant of the incentive for firms to innovate.

The authors provide insight into the appropriate design of patent litigation insurance (PLI) which would make it a superior instrument for financing patent defense in comparison with resorting to a financier once a patent infringement has occurred. Relative to ex-post financing, a basic PLI policy provides the incumbent with an unconditional commitment to litigate. When patent infringement can be expected, this commitment has a deterrence effect on the potential infringer, who will then only enter if the patent is weak enough. The cost of this arrangement, however, is that entry is always followed by litigation, even if the net value of defending the patent is negative. So excessive litigation occurs and therefore there is no clear dominance of PLI over ex-post financing. If infringement were not to be expected, no additional deterrence effect could be achieved while undertaking a basic PLI policy would simply imply paying the extra cost of wasteful litigation (incorporated to its premium).

To remove the wasteful litigation that a basic PLI policy induces, the analysis suggest a novel addition in the contract of PLI: the introduction of a deductible or co-payment in the arrangement, leaving uncovered part of the litigation-related financial needs of the incumbent so as to make her (or her ex-post financiers) to internalize some of the costs of litigating. The authors show that with an appropriate deductible, PLI can implement the incumbent's second-best outcome. This result has clear policy importance given that the European Union is considering the introduction of a compulsory PLI scheme. However the authors also conclude that obliging all innovators to subscribe to a standard policy may not be efficient since according to their analysis, the optimal value of the deductible and the associated premium depend on innovation-specific parameters. They suggest that governments should instead simply try to facilitate the existence of a competitive insurance market, which should be able to provide a PLI policy tailored to the characteristics of each innovator.

6. The European market for risk capital in international comparison

The individual research projects undertaken draw upon a great deal of newly collected, unique data sets, both from within Europe as well as internationally. Given the findings the observed structure of the European market, several implications for the ability of its financial systems to provide risk capital financing can be derived.

For example, the structure of sources of funds to risk capital financing in Europe suggests that a significant amount of capital is either directly or indirectly channeled via dependent sources (see the paper by Arcot and Bruno "An Empirical Assessment of European Venture Capital and of the Links Between Finance and Innovation"). Pension funds, being a potentially important source of funds with a higher degree of professionalization, do not play a role as important as in the US or the UK market. Given the scope for asymmetric information and opposing incentives, a potential lack of a professional investor base may distort the allocation of funds and consequently the success of risk capital financing projects.

The study by Da Rin, Nicodano and Sembenelli as well as by Cumming and Walz highlighted the importance of legal and regulatory frameworks in the success of risk capital financing of entrepreneurial firms. As the European member states differ in these frameworks and show different degrees of complexity and regulatory barriers, member states will also differ in their ability to provide financing to innovative firms via professional intermediaries such as VCs and in their ability to create new firms out of the existing supply of high-quality R&D.

Interestingly, the findings of Da Rin, Nicodano and Sembenelli suggest that there is no evidence of a shortage of risk capital in Europe. Even though theoretical considerations see such a role, this is rather in the case of capital under-provision during the early development of a VC market. As the European markets have already developed further, under-supply of funds does not appear to be an obstacle (any more). Furthermore, the same study also finds no evidence that public subsidies for venture capital or R&D expenditures have a positive impact on the success of innovative activities. This accords well with the often-cited "paradox" that Europe suffers from an inability to turn excellent scientific competence into successful commercial ventures. Other barriers than supply of funds or R&D expenditures seem to be responsible for this paradox.

The research network has also undertaken a direct comparison of differences between the US and Europe about the determinants of success in VC financing (as specified in the goals to theme 1). The focus of one of the studies (Hege, Palomino and Schwienbacher: "Determinants of Venture Capital Performance: Europe and the United States") is on contractual determinants between VC funds and their portfolio firms. The analysis confirms that there is a significant gap in performance between US VC firms and their European counterparts, both in terms of type of exit and of rate of return. Evidence is revealed that this gap might be attributable to some degree to several important differences in the contractual relationship between VCs and entrepreneurial teams, like the frequency and effectiveness of the use of instruments asserting an active role of venture capitalists in the value creation process. More precisely, the study identifies three such determinants. First, VCs in the US are much more assertive in reserving contingent control rights: they use more systematically financial instruments that convey residual control in case of poor performance, namely convertible securities, and they activate contingent control more frequently, as measured by the replacement of entrepreneurs and the termination of projects. Second, it seems that US

VCs have sharper screening skills than their European counterparts. This translates into a larger fraction of the total investment invested in the initial round and a higher degree of translating initial investments and funding frequency into success. Finally, there is some evidence for a more effective management of financing relationship and participation of different groups of investors in the US. Interestingly, the results suggest that relationship financing, which is more pronounced for European companies, does not have any significant impact on performance there.

Overall, the direct comparison we have undertaken indicates that venture capital firms in Europe are more deal makers and less active monitors; they seem to be still lagging in their capacity to select projects and add value to innovative firms. The relationship between VCs and portfolio companies is highly complex both in terms of input, which is necessary to develop an enterprise successfully, as well as in terms of payoff and incentive distribution, with asymmetric information problems playing an important role. As a result, many complex contractual structures and solutions to these problems have evolved in the mature US market, which might still need to fully develop in Europe. At the same time, public interventions and regulations determine the ability of professionals to make use of US and other experiences.

7. Regulatory issues and conditions favouring risk capital financing

Overall, the network's research has uncovered a great number of aspects, which affect the successful financing of innovative firms both directly and indirectly. Given the complexity of risk capital financing (due to the variety of different agency and informational problems), the major impression is that providing the right framework to a smooth functioning of the private risk capital markets is of major importance. Before considering more direct interventions in the last two sections of the report, this section discusses our findings and suggestions concerning the appropriate frameworks and regulations.

7.1 Regulations with respect to pension funds

A professional investor base appears to be very important as these investors actively work to reduce inefficiencies arising from asymmetric information between limited and general partners and from the cost of monitoring VCs' investment behavior. Apart from insurance companies, pension funds constitute a highly professional and increasingly important investor base (see the paper by Arcot and Bruno). While these funds are only of minor importance as source of funds in many EU member states, the widespread reforms of public pension systems and the transformation into privately funded pension systems should provide impetus to the development of a professional investor base as a source of funds. For this, it is not only necessary that pension funds are generally allowed to invest in private equity, but also the regulative and accounting frameworks have to be adapted.

Usually, long-term contracts between VCs and investors determine rights and obligations over the period of the investment. A sophisticated contractual design may reduce principal-agent costs in the relation between investors and VC fund managers. Covenants that restrict the venture capitalists' scope of action and compensation terms are the key items that govern the principal agent relationship (see the paper by Schmidt and Wahrenburg). Hence, the contracting parties can be expected to devise the right contracts generally themselves. However, as a means to support the ability of pension funds to invest in VC funds and to

alleviate potential inefficiencies from opportunistic behavior, the question of appropriate standards for reporting returns to VC investments, particularly with respect to partially exited or even non-exited investments, has to be addressed. Stringent accounting standards have been found to reduce over-reporting by VCs and are thus in the interest of both institutional investors and the economy as a whole (see Cumming and Walz).

Distorted reports are known to create frictions on capital markets, especially in highly information-sensitive capital markets like those for innovative firms and risk capital financing. Our research output clearly calls for action to tighten accounting standards, especially on information-sensitive areas like the level of unrealized returns, R&D accounting and other intangibles and accruals.

A specific accounting issue arising between LPs and GPs of a VC fund is how unexited investments are accounted for at fund maturity, as analyzed in Kandel, Leshchinskii and Yuklea. Limitations to investment contracts which restrict the timing of VC investments or which do not allow the allocation of cash-flow rights to VCs after a fund's end keep the parties involved from finding solutions to the problem of project continuation and termination decisions. Alternatively, the creation of certification institutions like brokerage trading on VC's portfolios may reduce the inefficiency arising from information asymmetry, thus allowing the operation of an efficient secondary market.

7.2 Legal environment, corporate governance, investor protection and accounting

The legal environment was shown to facilitate a plethora of aspects in VC financing, all being positive determinants for investment returns themselves: it facilitates syndication, i.e. risk and knowledge sharing, among venture capital providers; it facilitates and thus accelerates the deal originating process; it allows investors to device and enforce more complex contractual structures, thus offering better opportunities to overcome conflicts of interests. Albeit indirect in its effects, regulatory and legal structures are highly relevant aspects for a functioning market for risk capital financing.

The ability of VCs to provide risk capital to young firms depends on their ability to devise and enforce contingent financial claims and exercise active corporate governance. Even within Europe, differences within the legal environments turn out to affect the contractual and governance structures used. Better legal protection of investors enhances their activities in corporate governance, which has been shown to affect particularly young growth firms positively. The ability to enforce financial claims, which depends on the efficiency of a judicial system, enables VCs to use more explicit contractual covenants in their relation with portfolio firms, thus raising their expected returns and consequently their readiness to provide active support to these firms (see Bottazzi, Da Rin and Hellmann). This additional support offered by VCs (apart form capital provisioning) is a highly valuable input in transforming innovations into commercially successful businesses.

Additionally, better legal protection allows investors to use financial instruments that enhance the incentives of entrepreneurs to innovate. Hence, policies should try to improve the quality of legal systems to enforce rules and to reduce formalism and procedural complexities. Similarly, establishment of high corporate governance standards and the ability of investors to enforce these will enhance the supporting effect of VC financing to the development of successful growth firms.

Similar to legal and regulatory structures, corporate governance plays an important role for the success of venture-backed innovative companies and overall VC returns (see Cumming, Schmidt and Walz. While this was already well understood for publicly listed firms, our research shows that the positive effect of good corporate governance measures begins much earlier. For example, with better corporate governance rules, venture capitalists are observed to have a significantly higher representation in companies' boards. Thus, corporate governance rules are a prime facilitator to give VCs the necessary incentives to act as active advisors and monitors. The role of this second contribution of venture capitalists (besides the pure provision of capital) in the value generation process, seems to be one of the main differences between European and US VCs. Consequently, rules fostering good corporate governance are another means to strengthen the role of VCs particularly in Europe and to improve the attractiveness of the asset class.

Corporate governance plays also an important role for the shape of the relationship between GPs and LPs in VC funds. Certain features in agreements between GPs and LPs act as commitment devices, which positively affect innovative activities. For these mechanisms to work properly, governance and enforcement of rules matters at the fund level as well.

Additionally, corporate governance issues not only arise between VCs and firms, but also at the VC fund level. Corporate governance policies safeguarding the control leverage of VCs over their portfolio companies are an important means to ensure that VCs can impose tight budgets on innovative firms. This might be efficiency-enhancing if continuing innovative effort is needed from entrepreneurs.

Measures of investor protection turn out to be a crucial determinant in explaining the development of the risk capital financing sectors across countries and in explaining the returns of such investments (see Bottazzi, Da Rin and Hellmann). For example, the better investor protection in the UK seems to be a major factor explaining the much higher prevalence of venture funding there, as well as the deeper penetration of public equity markets into the segment of young and medium-sized firms. A higher degree of investor protection allows more dispersed ownership and the entry of relatively less sophisticated investors in high-growth segments. It also facilitates the organization of the venture capital industry and positively affects the achievable returns.

Finally, enhancing the comparability of company accounts across markets and lowering the different degrees and forms of regulations in capital markets enhance market transparency. This again raises the value-creation ability of private risk capital financing.

7.3 Capital gains taxes

Capital gains taxes reduce the ability of VCs and entrepreneurs to reap returns from their investments and effort, which are supposed to compensate them for the risk taken. Consequently, the relative attractiveness of early stage and high-tech investments deteriorates relative to the less risky returns of buyout investments. Generally, the taxation of capital gains has long been pointed out as a driver of both entrepreneurship and investment (see the study by Da Rin, Nicodano and Sembenelli). Recent theories argue in favor of exemption of capital gains tax on the ground of incentive effects for the provision of effort by venture capitalists.

At the same time, some caution has to be expressed concerning the effect of taxation on the overall supply of funds. Capital gains taxation and income tax incentives have a more complicated impact in the financing of innovation than commonly thought. In volatile market settings that lend themselves to booms and busts, oversupply of risk capital can occur and reduce incentives of VCs to provide valuable support to portfolio companies. On the other hand, time-varying tax policy can play an important role as stabilizer of flows of funds (see Inderst and Müller). As this might create other problems (for example of time-inconsistency), one can conclude that tax incentives focusing on successful portfolio companies in later stages seem to be preferable (see also the paper by Hirsch).

7.4 Capital market regulations

The realization of a large capital gain when bringing a company public is one of the strongest incentives to venture investing. Moreover, venture capital should be able to benefit from exiting from their investments before the marginal value of their time and money starts to decrease. Network research and the related literature found evidence that the creation of high-tech stock markets in Europe starting in the late 1990s had a positive impact on venture funding activity. This is in line with the opinion expressed in the EU's Risk Capital Action Plan.

Our research output gives a more detailed picture of regulatory instruments and their impact on success and failure of stock markets for entrepreneurial firms. Analyses of IPOs on European markets suggest that the process of IPOs and the successful exit and firm development thereafter are closely connected. Our analyses call for policy actions that impose strict standards on IPO processes, which reduce participants' (particularly investment banks' and financial analysts') ability to misbehave in favor of single parties of the transaction (see Degeorge, Derrien and Womack). In particular, the allocation of shares in primary offerings has to be guided tightly by rules and oversight.

At the same time, the design of stock markets specifically targeted at entrepreneurial or high-tech firms has to take into account the relevance of aftermarket liquidity. Liquidity considerations not only affect the further development of firms brought to the market, but these effects also determine the price at which these companies can be floated in the first place.

It was shown that the overall development of financial markets in Europe influences the degree of asymmetric information between market participants. Only a well-developed market will allow VCs to bring as many companies to the market in IPOs, which are both the most rewarding exit for investors and often a pre-requisite for entrepreneurial effort and business creation. Hence, policies to assure a smooth functioning of financial intermediaries (for example by reducing conflicts of interests between financial analysts and investment banking business) also affect the innovative activities of firms and their ability to receive risk capital financing. Similarly, as different VCs play different roles in the process of IPOs, more flexible regulations concerning lock-up periods in stock markets for entrepreneurial firms (and related aftermarket exit regulations) will help VCs to perform their roles in bringing young firms to the stock markets (see Tykvova and Walz).

Regarding capital market developments, our work also shows how the structure of capital markets matters for the success of risk capital financing for entrepreneurial firms. The analysis shows how imbalances in both demand for and supply of capital destroy the

positive incentive effects in financing relationships. Various policy measures affect this balance. In particular, market transparency turns out to have a clear positive effect on the value creation process in risk capital financing (see Inderst and Müller). Thus, the fragmentation of European capital markets might pose a problem to further successful development of the risk capital market, and measures to increase the transparency between these markets and to improve the ability of investors to be active in the various markets would be beneficial.

8. Public policy for risk capital

The network's research showed that independent private VCs generally appear to be most able to identify promising innovative firms and projects and are particularly successful in turning their investments into commercially successful firms (as documented by Tykvova and Walz). These VCs act as important financial intermediaries providing specialist knowledge and capital to newly created firms. Given the ability to specialize and be profit-driven provides independent VCs with strong incentives to invest investors' money most profitably. As a general suggestion, one can hence recommend to make use of the profession of VCs when targeting the risk capital financing situation of innovative firms. The following questions then arise: How can policy enhance the efficiency of capital allocation among funds and of funds to portfolio companies? When does the capital allocation mechanism via VCs fail such that other policy measures are necessary?

The work by Di Giacomo ("Public support to entrepreneurial firms: An assessment of the role of venture capital in the European experience") provides a cross-country comparison of the different European experiences in order to give further insights on the critical elements in public programs that favor the development of the risk capital market and private investments. The study focuses particularly on non-grant support, which includes direct funding of venture capital funds, regulatory reforms, tax incentives, guarantee schemes, mentoring and consultancy aid as well as support for the creation of business angels networks. Generally, these types of support are considered better suited due to their flexibility and broader form of support.

Public intervention in Europe not only used to be effective in ensuring high growth to financed firms, but also in increasing the VC market in some regions. This is expected to be important for the future market development as public investments should rather complement and not substitute the private sector actions. Since private equity investment is a highly specialized investment characterized by high returns but also high risk and uncertainty, too politicized or bureaucratic managers risk making them ineffective and wasteful. The public sector is recommended to rarely act alone but to rely on the support of specialized financial expertise offered by independent VCs.

Overall, our analyses provide several rationales for policy interventions, as market imperfections and externalities may prevail. The role of public funds in establishing VC markets in Europe is also acknowledged. However, it is also shown how inadequate structuring of the provision of public funds may be even harmful to its original goals. This is particularly the case when contractual and incentive structures of the parties to the transaction are neglected (see the paper by Hirsch). It is shown how guarantee programs in particular, but also other forms of subsidies destroy the relevant incentive structures. On the

other hand, measures like public private partnerships and ex-post grants (or tax breaks) potentially support risk financing and the success of innovative firms.

Several requirements that successful policy programs should fulfill singled out by our research are: the ability to recoup funding after exits; a structure that allows leveraging the capabilities of private investors; performance related management compensation; and clear investment guidelines. Without clear and strict requirements to the provision of public funds, inefficiencies arise not only with respect to the allocation of public capital, but also private VCs' investment decisions and entrepreneurial incentives can be affected as public funds might disable non-contractual commitment devices arising out of the limited provision of funds.

9. Public policy to entrepreneurial firms

An important aspect in supporting innovative firms is the protection of intellectual property. Even though patent protection is generally available, firms might be forced to defend their patents in case of infringements. The costs of patent defense might require significant financial resources, which particularly small innovative firms might lack. The analysis by Llobet and Suarez suggests that patent litigation insurance (PLI) might be able to protect intellectual property. However, this might come at the cost of excessive litigations. Allowing for different levels of deductibles in insurance arrangements alleviates this new problem. For this reason, policy should not focus on making PLI schemes compulsory for innovative firms, but rather support the development of competitive insurance markets which are able to provide efficient insurance contracts tailored to the individual needs and characteristics of innovators.

Other determinants for the successful creation of new firms from innovations are national regulations concerning the creation of new businesses (which range from the formalities needed to establish a corporation, to regulatory and administrative opacity and barriers to competition) and labor market regulations (see Da Rin, Nicodano and Sembenelli as well as Bottazzi, Da Rin and Hellmann). More restrictive rules in these areas increase the cost of creating new businesses as well as the development of existing businesses. Hence, abolishing overly restrictive labor market regulations in European member states will help in the creation and financing of new businesses.

It has been argued above that excessive provision of funds to the risk capital market might hinder the development of successful businesses out of innovative firms (see the paper by Inderst and Müller). Consequently, in an environment of increasing supply of private funds and high competition for good projects, promoting innovation by increasing R&D expenditure would be preferable. Means to enhance R&D activities include corporate tax exemption on R&D spending, providing researchers at universities with support in developing business ideas out of research results via incubators and setting up networks of business angels as intermediaries between VCs and potential entrepreneurs.

Another way to enhance innovation and the creation of growth firms would be the support of regional innovation clusters (see Di Giacomo). As spillovers from R&D are considered highly relevant but are usually not taken sufficiently into account by financiers, clustering of activities might allow investors to realize some of these spillovers. Additionally, if clustering results in agglomeration of skills and higher average human capital, as well as

fostering the experience of investors and entrepreneurs, then “networks of specialists” can be a source of higher rates of innovation and financing for innovative firms.

5) DISSEMINATION AND EXPLOITATION OF RESULTS

In terms of exploitation and dissemination of our research, the partnership has developed a very high intensity of contacts between its members and the European risk capital industry. Such contacts, which constitute one of the assets of the partnership, have largely been developed during the data collection. More than 200 venture capital firms have been in touch with the partners. The European Venture Capital Association, which represents the trade association for risk capital in Europe, has also been in contact with the partners, and it has supported the (successful) data collection of one of them. The management committee of RICAFE has decided to disseminate the results by e-mailing the more than 500 people around Europe and the world who requested to be notified of the progress of the project.

As a sign of the high reputation the project has earned, we have obtained substantial external funding for a Third RICAFE Conference, to be hosted by the Turin node on November 2005. This event will once again provide a high scientific forum for the latest research on venture capital in Europe and the financing of innovative firms. It will also provide an additional opportunity for the dissemination of our continued research output.

Working Paper Series

An important means of disseminating our research is through the RICAFE Working Paper series, which we started at the end of 2003. The dissemination activities through the project's dedicated research papers are detailed in Annex (1).

Website and Quarterly E-mail News letter

Since early 2003 the RICAFE website is active at the following URL http://www.lse.ac.uk/ricafe. The website has been widely advertised by the members of the partnership, and it has attracted a very large number of visitors. It is particularly telling that we have received over 500 requests for subscription to our periodical email newsletter. This number reflects the relevance of the economics of private equity and the financing of innovative firms for a wide community of end-users, and it also reflects the very high quality of our scientific production. Our periodical newsletters will provide updates on the partnership's activities to a wide range of final users, a large part of which are policy-makers and practitioners.

The website features a full description of the project, of the nodes and node participants, and has been used to manage electronically the submissions to both conferences. The online distribution of our Working Paper series has been started and well received as well. Overall, the website is proving useful in providing a high-level visibility to the partnership, and to help disseminate widely its results. To date, the website has received more than 23,000 visits, and has seen nearly 40,000 downloads of our Working Papers.

As stipulated in the project contract, an Executive summary of the results of the project to date has been posted on the website already with the previous report.

ANNEX (1)

Presentations of the research papers at academic conferences and workshops

We report here on the presentations of the working papers we have produced, organized by research topic.

"The determinants of venture capital and other forms of risk capital targeted at innovative firms"

Working Paper: *What drives the structure of private equity investments?* By Marco Da Rin, Giovanna Nicodano and Alessandro Sembenelli (Turin University)

- Third ECB-CFS workshop on the integration of European financial markets (Athens, November 2003)
- Seminar at St.Gallen University (January 2004)
- EconChange conference (London, March 2004)
- 6th Bundesbank Spring Conference (Frankfurt, April 2004)
- CEPR summer Corporate Finance institute (Gerzensee, Switzerland, 2004)
- American Economic Association Meetings (Philadelphia, January 2005)

Working Paper: *Private Equity Returns and Disclosure around the World* by Douglas Cumming (University of Alberta) and Uwe Walz (CFS)

- February 2004: Presentation at the University of Frankfurt Department of Finance
- March 2004: Presentation at the European Business School, Oestrich-Winkel
- May 2004: Presentation at the University of Cambridge

Working Paper: *Determinants of Venture Capital Performance: Europe and US*, by Ulrich Hege (HEC), Frederic Palomino (HEC) and Armin Schwienbacher (Amsterdam)

- University of Toulouse, Inaugural Conference for the Master in Finance (October 2004)

"An assessment of European venture capital"

Working Paper: *Human Capital, Organizational Structure and Financial Intermediation: Evidence from Venture Capital, by* Laura Bottazzi (Bocconi University), Marco Da Rin (Turin University), and Thomas Hellmann (Graduate School of Business, Stanford University)

- RICAFE First Conference (LSE, October 2003)
- Kaufman Foundation Private Equity Conference (Kansas City, March 2004)
- Wharton West 2003 Conference (San Francisco, May 2004)
- Amsterdam University (November 2004)
- IESE Business School (November 2004)
- American Economic Association Meetings (Philadelphia, January 2005)

Working Paper: *Contractual Relations between European VC-Funds and Investors: the Impact of Reputation and Bargaining Power on Contractual Design,* by Daniel Schmidt and Mark Wahrenburg (Center for Financial Studies)

- October 2003: 1st RICAFE Conference
- October 2003: 10th Annual Meeting of the German Finance Association

Working Paper: *Legality and Venture Governance around the World* by Douglas Cumming (University of Alberta), Daniel Schmidt (CFS/VCM) and Uwe Walz (CFS)

- European Business School, Oestrich-Winkel (March 2004)
- University of Cambridge (May 2004)

"Innovation, business creation and the stock market"

Working Paper: *IPO Underpricing and after-market liquidity* by Andrew Ellul (Indiana University) and Marco Pagano (University of Naples)

- FIRS Conference on Banking, Insurance and Intermediation, May 2004.

Working Paper: *Underpricing of venture-backed and non-venture-backed IPOs: Germany's Neuer Markt,* by Stefanie Franzke (Center of Financial Studies)

- Kiel Institute for World Economics Workshop (June 2003)

Working Paper: *Are IPOs of Different VCs Different?* By Tereza Tykvova (ZEW) and Uwe Walz (CFS)

- Third Workshop of the ECB-CFS Research Network on Capital Markets and Financial Integration in Europe (Athens 2003)
- Financial Management Association (FMA) European Conference (Zürich 2004)
- German Economic Association (VfS) Annual Meeting (Dresden, October 2004)

Working Paper: *Quid pro quo in IPOs: Why book building is dominating auctions* by François Degeorge, François Derrien, and Kent Womack

- University of Montreal (April 2004)
- 3rd Annual EVI Conference on Entrepreneurship, Venture capital, and Initial Public Offerings (Dartmouth (Tuck), Hanover NH, June 2004)
- Northern Finance Association conference (St John's, Newfoundland, September 2004)
- Auction and Market Design High Level Euroconference (Rome, September 2004)
- NCCR Finrisk Research Day (Bern, October 2004)

"Sources of finance and the choice of innovation activities in entrepreneurial firms"

Working Paper: *Participating Convertible Preferred Stock in Venture Capital Exits* by Sridhar Arcot (FMG/LSE)

- Second RICAFE Conference (Frankfurt, October 2004)

Working Paper: *What Role of Legal Systems in Corporate Governance and Contracting? Theory and Evidence from Venture Capital* by Laura Bottazzi (Bocconi), Marco Da Rin (Turin) and Thomas Hellmann (Sauder School of Business)

- IDEI (Toulouse, May 2004)
- Second RICAFE Conference (Frankfurt, October 2004)
- Tilburg (November, 2004)
- Universitat Pompeu Fabra (November 2004)
- Southern Swiss University (Lugano, November 2004)

- University of British Columbia (Vancouver, Canada, November 2004)
- American Finance Association Meetings (Philadelphia, January 2005)

Working Paper: *Financing and Corporate Growth under Repeated Moral Hazard* by Ronald W. Anderson (FMG/LSE) and Kjell G. Nyborg (LBS)

Working Paper: *Cash Flow-Investment Sensitivities of European Companies in the 1990s* by Alexander M. Swoboda

- October 2003: 10th Annual Meeting of the German Finance Association

Working paper: *Exit Timing of Venture Capitalists in the Course of an Initial Public Offering* by Werner Neus (University of Tuebingen) and Uwe Walz (CFS)

- University of St. Gallen (March 2003)
- University of Bonn (April 2003)

Working paper: *The Benefits of Shallow Pockets* by Roman Inderst and Felix Münnich.

- FMG Doctoral Seminar, London School of Economics, October, 2003
- First RICAFE Conference, London, October 2003

Working Paper: *A pecking order of venture capital exits – What determines the optimal exit channel for venture capital backed ventures?* by Carsten Bienz (CFS/Frankfurt)

- European Economic Association (Madrid August 2004)
- German Finance Association (Tübingen, October 2004)
- German Economic Association (VfS) Annual Meeting (Dresden, October 2004)

"Public incentives for venture capital and their effect on the development of commercially useful innovations"

Working Paper: *Public Policy and Venture Capital Financed Innovation: A Contract Design Approach* by Julia Hirsch (University Frankfurt)

- University of Frankfurt Workshop (April 2004)
- CPE-CERESS Workshop on "Public Policy and Start-Up Firms", Cologne (September 2004)
- Second RICAFE Conference, Frankfurt, (October 2004)

"Financing, contracting, intellectual property rights and firms' innovative strategies"

Working Paper: *The VC Fund's Limited Life Span As Source of Suboptimal Early Exits* by Eugene Kandel (Jerusalem), Dima Leshchinskii (HEC/Lally School of Management), Harry Yuklea (Jerusalem)

- Ricafe Policy Workshop (Brussels, April 2004)
- "The European Scientific Days" (Steyr, Austria, July 2004)
- 2nd RICAFE Conference (Frankfurt, October 2004)
- STE meeting, The Samuel Neaman Institute at the Technion (Tel-Aviv, November 2004)

Working Paper: *The Effect of Capital Market Characteristics on the Value of Start-Up Firms* by Roman Inderst and Holger Muller

Working Paper: *Patent Defense Financing* by Gerard Llobet and Javier Suarez (CEMFI)

- 6th Bundesbank Spring Conference (Frankfurt, April 2004)
- Seminar at CEMFI (Madrid, July 2004)
- XX Jornadas de Economía Industrial (Granada, September 2004)
- Seminar at the Federal Reserve Bank of St. Louis (October 2004)
- Seminar at University of Tilburg (November 2004),
- Seminar at the Universidad Rey Juan Carlos I (Madrid, December 2004)
- XXIX Simposio de Analisis Economico (Pamplona, December 2004)
- Seminar at the Universidad de La Coruna (March 2005)
- Seminar at the Universidad de Vigo (March 2005)

ANNEX (2)

Progress on deliverables

Deliverable n°	Deliverable Title and Itemized Description	Delivery Date (month)	Status
D1	• State of the art report with review of the literature	6	Completed
D2	• Map of research community of risk capital in Europe, including a list of key research topics, relevant research institutes and scholars in the EU	6	Completed
D3	• Detailed work-plan for each Work-package	6	Completed
D4	• Inventory of available databases and of data to be collected	6	Completed
D5	• Mid-term Report on the results of the data collection during the first 12 months	13	Completed
D6	• First set of Working Papers addressing the project objectives (at least six covering the first four Work-packages, as listed below)	13	Completed
D7	• Second set of Working Papers (at least one per Work-package)	19	Completed
D8	• Initial drafts of Special Reports on Theme 1	19	Completed
D9	• Initial drafts of Special Reports on Theme 2	19	Completed
D10	• Final set of Working Papers addressing the project objectives (at least one per Work-package, as listed below)	25	Completed
D11	• Draft of the Final Report	25	Completed
D12	• Final draft of Special Reports on Theme 1	25	Completed
D13	• Final draft of Special Reports on Theme 2	25	Completed
D14	• Initial draft of Special Report on Theme 3	25	Completed
D15	• Initial draft of Final Report	25	Completed
D16	• Final Report, which will include Special Reports on Themes 1, 2, 3	30	Completed

Note: all the deliverables were completed as per the original proposal. The only difference is that the research group has produced more working papers than anticipated.