

Why Does Private Equity Vary Across Countries and Time?

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Abstract

This study analyzes factors that influence the development of private equity markets across an array of industrialized nations. Such markets help facilitate economic development and growth by enabling small and startup businesses to access investment funds and providing incentives for innovation and entrepreneurship. The study concentrates on exploring the significance of such factors as the cost of capital, economic growth, exit options, innovation, legal structure, market transparency, and intellectual property rights. Not surprisingly, the empirical evidence indicates that profitable exit options are essential to the growth and development of private equity. The opportunity cost of venture investing is also found to be important. Moreover, institutional factors such as legal traditions, patent regulation, and the transparency of markets are also significant determinants of private equity investment.

1. Introduction

Private equity investments (PE) generally and venture capital funds specifically have been driving forces behind the innovation and stunning economic growth in some of the most influential sectors of the American economy. Venture capital investments (VC) have been instrumental in the emergence of such firms as Microsoft, Dell, Cisco, and Sun Microsystems to name but a few. These funds have also been credited with contributing to the explosive growth of the broader financial sector in the United States during the past decade. In addition, private equity and the innovation it fosters are seen as major forces underpinning the ability of an economy to sustain economic growth. Growth in productivity that venture funding fosters an environment in which levels of economic output increase without the occurrence of inflationary pressure. This phenomenon contributed to America's ability to sustain ten years of non-inflationary economic expansion.

Historically, matching entrepreneurs with those willing to fund their ideas was the role of wealthy individuals or institutions willing to take the risk. According to Gompers and Lerner (1999a) this relationship between investor and entrepreneur has existed since the time of Hammurabi in the Babylonian era. While venture capital has existed across time and space, the definition of the words as well as the activity involved has grown increasingly specific and sophisticated. Private equity investments are investments held by institutions and high net worth investors in both publicly and privately held companies. Private equity investors take active roles in managing their portfolio of companies. The major types of financing included under the umbrella of private equity are venture capital and management or leveraged buyouts.

In the United States, venture capital refers to a specific type of private equity investing: seed, early-stage, and expansion investments in companies. Seed capital is typically defined as an investment in an initial or idea stage. Early-stage investments are traditionally given to companies on the brink of producing and selling products when spending continues to outpace revenues. Expansion is considered the final stage of funding and is reserved for companies that have established products and market share but still require additional capital to expand their business. The American definition of venture capital does not include any type of buyout or recapitalizations. In contrast, European PE includes early stage activity, buyouts and market recapitalizations.

Although there is a consensus with respect to the importance of private equity investing, a large discrepancy exists in private equity market development even among the world's industrialized nations. Currently, the United States and the United Kingdom have the broadest and most developed private equity markets in the world. According to the European Venture Capital Association (2000), the United States was the worldwide leader in 1999 with private equity funds totaling \$98 billion, followed by the United Kingdom with \$12 billion of funding. The United States' notable lead is not surprising in light of its earlier establishment of a venture capital industry, a culture more inclined to take economic risks, the backing of large state pension funds, and early commercial exploitation of new technology. However, while the absolute investment levels of VC in the United States have far exceeded that exhibited throughout the rest of the world, the recent rate of growth in private equity funding in Western Europe has outpaced that of the United States, growing nearly 40% annually during the past five years. Despite the dot.com bust, the correction in the equity markets, and the sudden dearth of initial public offerings, venture capital investment in Europe is at an all-time high.

Yet, venture capital activity in developed European economies has remained widely variable. Therefore, while some European nations have witnessed dramatic growth in part due to venture-backed industries, many countries have been unable to reap the benefits from an active venture capital industry. The European Venture Capital Association (1997) points out that European venture-backed companies increased revenues by an average of 35% a year from 1991-1995, which was more than twice as fast as revenue growth of the leading European companies. In addition, venture-backed firms showed a 15% annual rise in employment over that same time period. This was seven times greater than the employment generated in the top 500 European companies. Clearly, venture-backed industries have made a significant contribution to European economic growth and international competitiveness. However, not all European nations have benefited to the same extent.

This heterogeneity in venture capital markets across countries provides the impetus to this study. The paper provides insight with respect to the issue of the determinants of venture capital for nine countries, Finland, France, Germany, Ireland, Italy, Portugal, Spain, the United Kingdom and the United States between 1986 and 1999. Leading contemporary scholarship describes in detail one or a limited combination of relevant determinants of private equity market development for a particular country across time or for a group of countries at one point in time.

This study extends and synthesizes both approaches with the utilization of a pooled cross-sectional, time series system to empirically examine the issue. The panel approach employed here is novel in that it allows us to jointly examine the significance of economic determinants over time and institutional factors across countries. Results indicate that market capitalization, the real interest rate, and legal traditions are all significant determinants of PE funding.

The paper is organized as follows. Section 1 is the introduction. Section 2 reviews the literature on venture capital investment and the links between financial market development and economic growth. Section 3 presents a discussion of the variables included in models of venture capital funding. The fourth section discusses the data and the regression methodology. Section 5 presents the empirical results and the implications of the findings. Section 6 concludes.

2. Literature Review

According to Gompers and Lerner (1999a), the first modern venture capital firm, American Research and Development (ARD), appeared at the close of World War II. It was founded by the president of the Massachusetts Institute of Technology, who along with local business leaders sought to commercialize the technologies developed for the war (Gompers and Lerner 1999a). Despite ARD's success, only a handful of other venture firms followed in this vein, generally structuring themselves as publicly traded-closed end funds. The annual flow of money into these funds during their years of existence never exceeded several hundred million dollars. However, funds flowing into the venture capital industry in the United States increased dramatically during the late 1970's and early 1980's. An important contributing factor was a 1979 ruling that allowed pension funds to invest money in venture capital and other higher risk investments. The final major change in the American venture capital industry was the rise of the limited partnership as the dominant organizational form.

The startup companies typically funded by venture capital investments operate in relatively new markets where information is incipient or scarce. These firms usually do not have a past record that can be used to measure their performance and the majority of their value lies in the potential for future growth rather than current or tangible assets. As a result, there are large costs due to administration, information gathering, and search efforts that coincide with funding a startup company. The costs of matching ideas and funding are attributable to issues such as adverse selection and moral hazard. Atje and Janovic (1993) further explain that because the

riskier and possibly more productive investments are illiquid, investors wishing to participate must rely on financial intermediaries to disperse the risk and provide liquidity. This financing void has led to the emergence of venture capitalists to fill the role of financial intermediaries for startup companies.

As the venture capital industry has expanded, it has developed standard procedures that are well adapted to environments characterized by uncertainty and asymmetric information between principals and agents. Sahlman (1990) provides extensive research on the structure and governance of venture capital organizations. As noted above, the prevailing organizational form in the industry is the limited partnership, with the venture capitalists acting as general partners and the outside investors as limited partners. The partnership structure usually limits the amount of capital that can be invested in a single venture, which helps promote diversification across an array of higher risk investments. In addition, many VC contracts call for mandatory distribution of realized gains. This prevents the fund from increasing its risk without an increase in the return on its capital.

The startup firms typically funded by venture capitalists present a unique set of issues for corporate governance and, because of the issues noted above, startups place particular demands on monitors of financial performance. Jensen (1993) describes the type of investor suited for these startup companies as an 'active investor.' Active investors are those that have a large financial interest in their investments but can also provide an impartial view of the management of these firms. Due to legal constraints that prohibit holding large equity stakes in a company or being actively involved on a company's board of directors, many of the most common financial intermediaries such as pension funds, banks, insurance companies, and money managers are unable to perform the role of active investors. Sahlman (1990) finds that venture capitalists solve problems regarding corporate governance and monitoring through extensive due diligence regarding startup companies' businesses. In addition, they keep a hands-on relationship by maintaining close contact with the company's management, sitting on the board of directors, or performing some of the key corporate functions for the firm.

Sahlman (1990) also addresses the agency problems that can plague the relationship between the venture capitalists and limited partners due to the high degree of asymmetric information. The venture capitalists, who play an active role in the portfolio companies, have a greater amount of information than the limited partners. Therefore, in order to reduce the agency

problem the life of a venture capital fund is limited. This implies that the limited partners can refuse to invest beyond their initial commitment. Additionally, the compensation system is structured to provide the proper incentives, and a mandatory distribution of gains removes questions regarding the allocation of returns from a successful sale of assets in the portfolio.

Prior to the later half of the 1990's, there were numerous misconceptions regarding the venture capital industry and the funding of new businesses. An article in the *Washington Post* (Sloan 1997) is representative:

Venture capitalists...take a company public while the ink is still drying on its incorporation papers. Venture capitalists would rather have you risk your money than risk their own. Besides, going public lets them profit now, rather than waiting.

These misconceptions spurred Gompers and Lerner (1997) to undertake comprehensive research on the role of venture capitalists. Their study produced three key findings. First, venture capitalists represent a viable solution to financing high risk and potentially high return opportunities. These types of companies have difficulty obtaining bank funding or debt financing because of a lack of assets and uncertain cash flows. In order to solve this problem, venture funds are structured as limited partnerships with a lengthy investment time horizon to allow for business development. Second, venture capitalists provide a much-needed filter of entrepreneurial ideas through an intensive review and selection process. This process effectively reduces the adverse selection problem inherent in business funding. In addition, venture capitalists intensely monitor their portfolio of companies and require substantial control over companies' business decisions. Third, venture investors play a key role in managing the exiting of these investments through either initial public offerings (IPO) or merger and acquisition (M&A) opportunities.

While the research outlined above concentrates on the unique role of VC in the financial sectors and the history and structure of the industry, more recent work inspects specific factors that contribute to the development of an active venture capital market. La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1996) concentrate on the role of government and legal structure as an explanation for the discrepancies in size and depth of capital markets around the world. They review numerous countries with respect to their levels of capital market development and legal traditions. The different legal traditions are classified as English common law, or French, German, and Scandinavian civil law. Legal rules of civil law countries are derived from Roman Law and have been developed by legal scholars and then incorporated into commercial legal

code. In contrast, common law is British in origin. It is based on the accumulated history of individual rulings with respect to specific types of disputes. Over their sample of 49 countries, the authors find that common law countries give investors stronger legal rights than civil law countries by providing better legal protection to shareholders, better creditor rights, and requiring better accounting standards and business practices. Thus, the results are striking: English common law countries as a whole vastly outperform the civil law countries in promoting developed financial markets. This finding is extremely relevant for the discussion of the determinants of venture capital funding because of the clear correlation between institutions, investor protections, and, as a consequence, external financing options available to the firm.

Black and Gilson (1997) explore the characteristics of financing as determinants of venture capital. In particular, they emphasize the importance of equity versus bank financing. Specifically, the capital structures of Japan, Germany, and the United States are examined in order to explore the spectrum of possible methods of financing prevalent in the industrialized nations. Their results indicate that an active IPO market is a key factor in venture activity due to the fact that initial public offerings offer a quick exit for the investor. This is in direct opposition to bank loans, which have no implied exits for the entrepreneur or their financiers. The second and less obvious reason that IPOs are important is that an IPO alters control of the organizational structure of the company itself. Black and Gilson describe the implicit change of control as a major reason that the entrepreneur prefers an IPO exit. At the time of the public offering, the venture investor has the option to sell his stake in the company. Frequently, this simply entails a reduction in the number of board seats the investor is entitled to and therefore, a drastic limitation on the amount of control the venture capitalist wields. For an entrepreneur, this setup is desirable because it effectively returns control of the company back to the creator.

Black and Gilson (1997) find that in Germany, the majority of capital is derived from bank lending. This limits exit options for German firms to stock buy-backs or M&A transactions. Frequently, multiples related to these exit activities are far lower than a traditional IPO, making the entire process less lucrative for the investor. Similarly, in Japan the majority of financing activity is through the bank lending process. This results in the same dearth of exit options and control issues that German venture-backed companies face.

Even in countries such as Japan or Germany that do not have restrictions on banks holding equity in companies, the banking sector is not as efficient in filling the role of corporate

governance for startup companies. Frequently, these banks lack the specialization, focus, and managerial involvement necessary to help startups. For example, Edwards (1994) notes that German banks do not play an active role in management and that bank representation on the board of directors is very rare.

In the context of these findings, Black and Gilson (1997) also review the Irish and Israeli venture capital markets. They argue that Ireland has a strong reliance on the United Kingdom's active equity markets, which allows Irish companies to exit with an IPO on the British exchange. They argue that this ability to tap into the well-developed and liquid British market in large measure explains Ireland's impressive venture industry. Similar factors are at work in the Israeli market as Israeli venture firms enjoy easy access to the American NASDAQ market. In fact, they are the third most represented nationality following only the United States and Canada on the NASDAQ exchange. These findings lead Black and Gilson to prescribe a program of reliance on developed IPO markets as a solution for countries hoping to improve their venture capital industry.

Ritter (1998) supports this conclusion by focusing on the role of IPOs as exit strategies in promoting venture capital development. He addresses the problems associated with raising capital from a small number of investors who play an active role in managing the firm. As long as the firm remains a private entity, any equity investment is illiquid. As the firm becomes larger, conflicts between entrepreneurs and venture capitalists may arise and private financing may instead, become a disadvantage. This is the point in the life cycle of a firm's financing at which it is optimal to go public. According to Ritter, venture capitalists are willing to finance firms knowing that an active IPO market will allow them to cash out if the firm succeeds. Therefore, he argues that the greater opportunity for IPOs in the American market has helped to create and fund young companies especially in the most highly innovative sectors of the economy by making venture capital investments more attractive.

Jeng and Wells (2000) produce one of the most comprehensive empirical assessments of factors that determine the growth and development of venture capital markets. Their approach is similar in spirit to this investigation. They explore an array of factors that influence the level of activity and development of private equity markets. They use a linear regression for a cross-section of 21 countries to model both the supply and demand for venture capital funds. The model incorporates IPOs, accounting standards, GDP growth, and market capitalization as

determinants of the supply of venture capital funds in an economy. The demand for venture capital funds is a function of factors noted above, as well as labor market rigidities, which serve as a proxy for entrepreneurship. Consistent with the earlier research such as Ritter (1998) and Black and Gilson (1997), their results indicate that initial public offerings are the most important factor in determining venture capital funding. In addition, private pension funds were found to be a significant determinant of funding over time, but not across countries. Surprisingly, the study found that market capitalization and GDP growth were insignificant.

Building on the works of La Porta et al (1996), Jeng and Wells (2000) also address the influence of institutional, regulatory, and cultural factors on venture capital. They suggest that government policy can have a strong impact through the creation of a favorable venture environment by creating direct programs aimed at supporting the industry. Embedded within their discussion of government policy are different legal traditions, tax codes, and government regulations that all influence the environment for venture capital funding. This is clearly evident in the investment regulations of pension funds and other large investment vehicles. In the United States, pension funds represent a large source of capital for private equity investments. However, pension funds have only been able to invest in venture capital funds since legislation was passed in 1979. According to Gompers and Lerner (1999a), in the eight years following this decision the amount invested in new venture funds soared from \$481 million to nearly \$5 billion, with pension funds accounting for nearly half of all contributions. Germany witnessed a similar increase in venture capital funding since easing restrictions on pension fund contributions into private equity investments. In addition, Ireland experienced a large increase in PE investments as a result of a government recommended increase in private equity investments by pension funds in 1994 (Jeng and Wells 2000).

The lesson that can be drawn from these observations is that when government institutions assume an active role in developing the venture capital marketplace, factors such as IPO activity tend to have less of an influence on the overall level of venture market activity. According to Jeng and Wells (2000), active government involvement is able to generate venture capital investments where it otherwise would have been non-existent. This leads to the conclusion that institutional factors need to be considered as a major determinant of venture capital development.

The recent focus on understanding the determinants of venture capital is a result of the recognition that venture-backed companies have a role to play in promoting entrepreneurship, innovation, and economic growth. Consistent with the evidence provided by the European VC Association noted in the introduction, a 1997 study by the National Venture Capital Association found that venture-backed firms in the United States create jobs at a far faster rate than Fortune 500 companies. Venture-backed companies have also done well even when compared to other high-growth companies. According to the same report, in 1995 annual revenue growth for venture-backed high growth companies was 36.8% compared to 23.8% for non-venture backed high growth companies and venture capital investments have been instrumental in the development of new technologies. Thus, by providing the necessary funding for developing companies, VC can foster the technological change and innovation that contribute to economic growth.

True venture markets are only present in countries with relatively well-developed financial sectors. Well-developed financial sectors have been found to be a significant determinant of economic growth. In fact, in their study of 47 different countries Levine and Zervos (1998) find that a number of different measures of financial sector development are positively associated with growth. The transmission mechanisms are hypothesized to be more efficient allocation of funds, capital accumulation, and the technological innovation these funds foster.

With respect to venture capital, Kortum and Lerner (2000) are the first economists to scrutinize the relationship between venture capital funding and innovation. They examine twenty distinct industries in the United States manufacturing sector over a period of three decades to determine whether venture capital funding has had an impact on the number of patented innovations. They find that venture capital funding is in fact associated with a substantial increase in patenting. A dollar of venture capital is found to be about three times more potent than a dollar spent on traditional corporate research and development (R&D) with respect to innovation.

Venture capital averaged less than 3% of corporate R&D expenditures from 1983 to 1992 but was responsible for nearly 8% of industrial innovations over the same time period. Kortum and Lerner (2000) acknowledge that, in the association between VC and innovation, higher levels of innovation might be a reason for increased venture funding. That is, reverse causality

may be present. However, Gompers and Lerner (1999a) examined whether venture capital actually drives innovation or simply leads to a larger number of lower-quality patents. The results indicate that venture capitalists are more familiar with protecting innovations and hence utilize that ability to apply for patents. In addition, the patents applied for by venture-backed companies are found to be of a higher quality and are more often cited by other patents. These findings suggest that venture-backed firms are more likely to receive a higher quality patent than non-venture backed firms, hence venture capital may play an important role in fostering innovation.

Gompers and Lerner (1999a) state that one way in which venture capital facilitates innovation is through the screening process used in selecting investment opportunities. Unless a venture firm sees the potential for patents or some other form of protected intellectual property it is unlikely to invest. And, as noted by Gompers and Lerner (1999a) in addition to providing funds, venture capital firms provide the needed guidance and managerial effectiveness that allows young firm to concentrate on developing innovative products. On the other hand, traditional corporate R&D spending is typically not undertaken in such a nurturing environment.

In the work of Levine and Zervos (1998), financial market liquidity is a key factor in determining economic growth. Additionally, the current literature on entrepreneurship finds that liquidity constraints are some of the biggest problems faced by entrepreneurs in the early stages of business development [see e.g. Evans and Jovanovich (1989)]. With respect to startup firms, venture capitalists play a crucial role by providing a matching function between those who have excess funds and those who need them. Thus venture capital also fosters entrepreneurship by reducing problems faced by young businesses due to liquidity constraints.

One way to overcome the liquidity constraints noted by Evans and Jovanovich (1989) is to have large corporations play an active role in the development of startup companies with innovative ideas. However, there are many issues that make this an inefficient form of corporate governance for startup firms. For example, Hardyman, et al (1983) find that legal difficulties often arise over whether the large company has access to the startup's proprietary information. Sahlman (1990) points out that the approval process within large corporations is slow and ineffective. In addition, the entrepreneur is not sufficiently motivated due to the lack of equity stake in the new firm. Thus venture capital is the natural source of funding and oversight of new, highly innovative firms. In this capacity VC fosters innovation and growth.

3. Private Equity and Its Determinants

This section begins with a brief overview of private equity markets in each of the nine countries studied here. Graphs of these series for each country are presented in Figures 1 through 9 in the appendix. The literature presented in the previous section is then drawn upon to develop a parsimonious list of variables that is included in the empirical analysis.

Private equity investing did not really begin in Finland until the mid 1980's and, as can be seen in Figure 1, did not really begin to grow until the mid 1990's.² However, after only 15 years the industry has become highly active and plays a major role among institutional investors. Government-backed funding for startup companies provided the impetus to the VC industry in the early 1980's, however, the role of government has diminished as the industry has continued to mature. Industry investments have been focusing mainly on technology, with 46.7% of funds allocated towards high-tech companies. The legal and fiscal environment in Finland has been stable and relatively favorable towards private equity. The Finnish economy and stock market performed very well during the end of the 1990's, with shares on the Helsinki exchange climbing to an all-time high. In addition, Finland has also witnessed an increase in "business angel" investing due to the many entrepreneurial successes over the past few years. These successes helped propel the total amount of divestments from FIM 320 million to FIM 507 million from 1998 to 1999. In 1999, seven companies were divested by IPO, the majority of them on the Helsinki Exchange.

In Figure 2 we present the French PE market series. In France the private equity industry is very specialized. It is comprised of three principal fund structures that focus on particular industries or stages of financing. In addition, divestment by means of an LBO has been one of the major exit strategies for private equity investors, followed by trade sales and the sales of public equity. France witnessed a large increase in the number of private equity funds operating in 1999 due to a favorable economic environment and the rapid expansion of European high growth stock exchanges. These developments improved exit opportunities for private equity investors. The close of the 1990's also saw the introduction of several legal and fiscal measures which have encouraged venture capital investment and help explain the notable upturn in PE activity after 1997.

² Finland private equity funds raised, 1986-1987 = Previous year PE funds raised * GDP Growth

As witnessed in Figure 3, the 1990's witnessed abundant opportunities for private equity investments combined with an increasingly more favorable institutional environment for PE in Germany. This boom in private equity came after years of sluggish activity due to German reunification, a poor institutional infrastructure, and slow economic growth. After only DM 2.6 billion in 1997 and DM 3.8 billion in 1998, the amount of new funds invested in PE jumped to DM 6.2 billion in 1999. This has been the result of a few notable factors. The creation of the "Neuer Markt" stock exchange provided an outlet for many successful exits through initial public offerings. More than 50% of the companies listed on the Neuer Markt are or were backed by venture funding. In addition, a 1999 tax reform reduced many important corporate tax rates and eliminated the capital gains tax on many specific investment opportunities. Also, European and American venture capital companies have been steadily joining the German market. The high-tech area in particular witnessed an increasing number of incubators during the late 1990's.

Economic growth in the Irish economy has been among the highest of all OECD countries in recent years. This has resulted in low rates of unemployment and stable interest rates that have created a very favorable investment climate. Ireland's private equity market has been a beneficiary of this rapid economic growth. Total new funds flowing into the Irish PE market doubled from 1998 to 1999 and almost half of the new funds raised were allocated toward high-tech investments. The legal and fiscal environment has been largely supportive of the private equity industry, maintaining a relatively low capital gains tax of 20%. This rate has encouraged many entrepreneurs who have sold their business to reinvest in the high-tech sector. In addition, beginning in 1994 the government endorsed increased private equity investments from pension funds. This change accounts for the spike in Irish PE activity in Figure 4. The most common exit strategies are trade sales and the buy back of shares by the company itself. In the Irish market, exiting through initial public offering only arises in a limited number of circumstances and those that do often occur on the London Stock Exchange.

The Italian private equity series is displayed in Figure 5. Clearly it has experienced a period of rapid expansion during the last few years. The growth has been spurred largely by the introduction of several important regulatory reforms, most notably with respect to corporate and investment tax laws. In addition, there has been an increasing trend toward greater specialization of private equity, primarily in the high-tech sector. The total amount invested in high-tech grew

by over 225% from 1998 to 1999. Trade sales remain the most common method of divestment, however, their relative share fell from 58% in 1998 to 37% in 1999.

Figure 6 indicates that private equity in Portugal underwent a period of rapid growth during the 1980's and early 1990's.³ However, a slowdown in the Portuguese economy in the middle of the 1990's limited the amount of funds available and the amount of profitable business opportunities. The legal and fiscal environment was altered in 1998 with the publication of a new venture capital legal framework, which attempted to foster growth in the private equity industry. The majority of divestments are still in the form of trade sales. However, 19% of divestments in 1999 were accomplished through the sale of equity compared to only 4% one year earlier.

Private equity activity in Spain began in the mid 1970's, mainly as a result in the government's interest in venture capital as a mechanism to allocate money for regional development. However, only from 1987 on can the industry's growth be attributed to private venture capital funds. In Figure 7 the PE series from 1986 on is presented. In Spain, the lack of an adequate environment for venture capital led to a diminishing importance of start-up companies until the late 1990's. Since 1997, the economic reforms that have coincided with Spain's participation in the European Monetary Union have encouraged economic growth and the flow of money into private equity. As a result, total funds under management nearly doubled from 1996-1999. The Spanish government has become increasingly interested in developing an environment for small and medium sized companies and as a result passed legislation offering tax incentives to venture capital investors. Finally, trade sales have historically been the most common exit strategy for Spanish venture investments, however, recently there have been no changes including the establishment of a new stock market designed to facilitate IPOs.

As is evident in Figure 8 (note the scaling of the vertical axis), the United Kingdom is home to the largest private equity industry in Europe. According to the European Venture Capital Association, the UK accounted for 46% of total European private equity in 1999. Private equity in the UK is funded primarily from institutional investors such as pension funds and insurance companies. The market for private equity has seen rapid growth since the mid 1980's due in part to the strong performance of the domestic economy, the establishment of a secondary stock market, continuing improvement in the entrepreneurial environment, and a recent surge in

³ Portugal PE funds raised, 1995 = 1994 PE funds raised * GDP Growth 1995

high technology and internet related ventures. In addition, the UK has one of the most favorable legal and fiscal environments for private equity in Europe.

Finally, a graph of the American PE series is presented in Figure 9. The United States is home to the largest and most developed private equity industry in the world. In many respects, the US was the pioneer behind creating a successful venture capital market. As noted in the introduction, the first VC firm, ARD, was established in the aftermath of World War II. Funds flowing into the venture capital industry in the United States increased dramatically during the late 1970's and early 1980's. An important contributing factor to the increase was a 1979 ruling that allowed pension funds to invest money in venture capital and other higher risk investments. Over the past two decades the private equity industry in the US has raised enormous funds from both individual and institutional investors. During the late 1990's, the technology boom and the emergence of the NASDAQ stock market helped propel venture capital investments to record level.

One of the key factors cited in the success of venture markets in the US and the UK has been the presence of a viable and profitable exit mechanism. This feature has been regarded as a key determinant of venture funding. As noted in Section 2, Black and Gilson (1997) point out that the existence of IPOs as an exit mechanism has contributed to the large amount of venture funding in countries with their own or with easy access to active stock markets. The United States, the United Kingdom, Ireland, and Israel have all utilized the presence of active equity markets to develop a significant amount of venture capital funding. This can be explained by the fact that the main risk of a venture investment is the risk of insufficient returns. Therefore because IPOs are the most profitable form of exit and they enable managers to reestablish their control over the firm, they are important to VC market development.

Clearly, initial public offerings are only one potential exit strategy for a venture capital investment. However, research has shown that an initial public offering is far and away the most attractive. A study conducted by Venture Economics in 1998 found that \$1.00 of venture capital investment in a firm that eventually goes public yields a 195% average return over a holding period of four years, while the same investment in a firm that is acquired by another firm provides only a 40% average return.

However, as was noted in the introduction, in the majority of European markets, trade sales, or sales of a startup company to a larger established company, are the most common exit

strategy for venture capital investments. According to Jeng and Wells (2000) the percentage of divestments accounted for by trade sales from 1991-1995 in various European markets ranged from 30% in the United Kingdom to 76% in Portugal. Thus, while IPOs can be considered the most precise measure of the availability of profitable exit strategies, market capitalization represents a more general proxy for exit options across the array of diverse countries included in our sample. Market capitalization reflects the overall breadth, depth, and liquidity of equity capital markets. As a result, market capitalization can be considered an explanatory factor for VC funding. Increases in market capitalization signify both a more liquid market and a more favorable environment for investors in general. Therefore, larger equity market capitalization should reflect greater supply of funds available for venture capital investments.

Liquidity, in particular, can be a major determinant of the development of private equity markets. Specifically, liquidity constraints have been seen as an impediment to private equity in certain European markets. In Europe, the fragmentation of national markets is a major reason for lower volume on each individual country's exchange. This low volume translates into reduced access to capital for both young companies and established corporations. As a result, one of the major new efforts currently underway is to consolidate the sovereign markets in Europe in order to create a larger more liquid European Union marketplace for equity securities. McCurry (1999) asserts that two major changes must be made in Europe to achieve maximum growth in private equity: the creation of a pan-European exchange to improve liquidity in equity markets and a harmonization of regulations and tax codes to prevent arbitrage opportunities on the continent. These changes would increase the pool of investors able to invest in private equity.

The state of a country's economy should also affect venture capital market growth and development. According to Arcs and Audertsch (1994) macroeconomic fluctuations have a profound influence on business startup activity. Results from their work indicate that expansions are found to lead to an increase in the number of startup firms. Since an increase in startup activity requires additional funding, GDP growth should increase the demand for venture capital funds. In addition, GDP growth leads to enhanced business opportunities, more economic success, and a more favorable environment for investors. This serves to increase the supply of venture capital funds available in an economy. Since growth in GDP works to increase both the supply and demand for venture funds, it is reasonable to expect GDP growth and venture capital investing to be positively associated.

The real lending rate in an economy can be viewed as the opportunity cost of holding money and the real cost of obtaining funding. High lending rates correspond with a high opportunity cost to providing venture capital funding. As a result, institutions and individual investors are less likely to take on the risks inherent in venture capital investment thereby decreasing the supply of venture capital funds available. In addition, the lending rate also serves as an indicator of both the depth of the debt market and the risk premium inherent in a given country. A higher lending rate suggests limited sources of borrowing and/or more risky borrowing and lending environments. Therefore, a higher lending rate signifies that venture firms have less access to conventional investment funding through the debt market and face a higher risk premium. In addition, angel investors confront higher opportunity costs to VC investing thereby reducing important sources of funds. Higher costs of capital also diminish the demand for venture capital funds. Thus, higher real interest rates should have an unambiguous negative impact on VC funding.

In addition to these macroeconomic variables, the actual number of patents applied for, granted, and denied reflects the level of innovation and regulation in an economy respectively. Jeng and Wells (2000) note that more innovative economies are more likely to have greater VC activity. They use labor market rigidities as a proxy for the innovativeness of a given economy. However, this study utilizes the number of patents applied for in a given country as percent of its GDP to represent the innovation per dollar of productive activity. In countries where, for cultural, social, political, or institutional reasons, innovation and creativity are not stressed, this number will be small. However in a nation such as the United States, which culturally encourages risk taking and entrepreneurship, the number of patent applications will be large. This relative difference in cultural perspectives towards entrepreneurship and innovation is an important variable in determining private equity activity.

Cultural conditions are extremely difficult to quantify. Therefore, the patent application data is used as a rough proxy to estimate the amount of innovation relative to output in an economy along with the risk preference inherent in a given economy. In addition, the percent of patents denied variable measures the difficulty in securing a patent in a given economy. Higher percentages of patents denied may signify greater regulation that can impede innovation and stifle the potential returns to a venture capital investing. On the other hand, patents denied may reflect the soundness of the screening process noted by Gompers and Lerner (1999a). In this

capacity, it may be the case that higher percentages of patents denied could positively affect venture capital activity.

In that Kortum and Lerner (2000) have shown that VC and patenting are associated, it stands to reason that intellectual property rights may be an additional institutional factor determining the robustness of a nation's venture capital industry.

According to Park and Ginarte (1997) intellectual property rights (IPR) affect economic growth by stimulating the accumulation of factor inputs such as research and development and physical capital. The major benefit from strong IPR protection is the impetus it provides for the research sector to invest and take risk. Park and Ginarte (1997) conclude that a country lacking strong IPR protection is very unlikely to establish innovative sectors in the economy, as people are unwilling to take the risk inherent in entrepreneurship out of fear they will not be adequately rewarded. As a result, lack of IPR protection may diminish the demand for venture capital funds by reducing the number of potential entrepreneurs. Similarly, it may diminish the supply of venture capital funds by lowering the potential value of a venture capital investment.

According to Park and Ginarte (1997) intellectual property right protection can be gauged by looking at specific variables such as patent agreements, provisions for loss of protection, enforcement mechanisms, and duration. In fact, they employ these factors to establish an index of property rights protection from 1960-1990, which is presented in

Table 1**Intellectual Property Rights Metrics**

Country	Value	Dummy Value
U.S.A	3.52	1
U.K.	3.26	1
Ireland	2.46	0
Finland	2.39	0
Germany	3.29	1
France	3.48	1
Italy	3.5	1
Spain	3.53	1
Portugal	1.82	0

The countries are assigned an IPR index score between 0-4 based on the compulsory licensing of inventions, the revoking of patents, and the exploitation of patents. The scores for the countries in our sample of countries range from 1.82-3.53. Due to the wide gap between countries, 3.0 was determined to be the cut-off point between countries with high levels of property right protection and those without. Countries with an IPR index value greater than 3.0 receive a one in the regression while countries with a value less than 3.0 receive a zero.

Looking at a sample of the world's most developed economies illustrates that some countries have been able to produce stronger capitalistic systems than others. Specifically, nations such as the United States and the United Kingdom have more developed capital markets and more companies that go public than nations such as France and Germany. According to the Wall Street Journal (9/6/01), the main factor in capital market development can be traced to the different legal traditions that emerged throughout history and have continued to influence business, investors, and government. As pointed out in Section 2, the two main legal traditions are common law, with its roots in England, and civil law, with its roots in Ancient Rome and redefined later throughout Europe. Common law countries such as the United States, the United Kingdom, and other former British colonies, rely on independent judges and juries to establish legal precedents, which are then used to determine future cases. Hence, the bodies of law with regard to a specific issue become cumulative. However, in civil law countries, which include most of Europe and Latin America, law is established by judges on an individual case basis with no legal precedent. As a result, civil law can produce more arbitrary rulings that are not well adapted to change. In our sample the United Kingdom, and the United States are all classified as common law countries while Finland, France, Germany, Italy, Portugal, and Spain are all subject

to civil law traditions. According to a study by Shleifer (1998) civil law countries exhibit heavier regulation, weaker property right protection, more corrupt governments and less political freedom than common law countries. He argues that investors in civil-law countries are less certain that their property rights will be enforced and as a result fewer individuals are active in financial markets.

Certainly these points illustrate the fact that developed capital markets cannot exist independently of the laws and government institutions they operate under. As noted above, the work of La Porta, et al (1996) finds strong links between capital market development across different countries and the legal traditions followed by those countries. The evidence confirms the basic hypothesis that being a shareholder or creditor entitles an investor to different rights depending on a nation's legal structure.

This issue of legal traditions and their implications for shareholders may have dramatic effects on the development of private equity markets across countries. For example, if investors are not well protected they will not invest in venture companies and entrepreneurs will have greater difficulty obtaining funds. In addition, smaller companies have a more difficult time procuring financing in civil law countries due to reliance on public funding and concerns over bankruptcy law. High concentration in the ownership of companies is also a common result of poor investor protection. These factors all decrease the amount of venture capital activity by making it unsafe for venture capitalists to invest in start-up or early stage companies.

This study postulates that as a result of less capital market development, weaker investor protections, and fear of contract repudiation, civil law countries suffer from less developed private equity markets. In these nations, early stage companies become dependent on bank loans or public financing to obtain the capital necessary to grow. As a result, there is a sub-optimal quantity of investment in high-growth and innovative sectors of the economy. On the other hand, common law countries provide the incentives and legal protection that foster strong venture capital markets.

In order to incorporate these ideas into the model employed here, legal traditions have been operationalized as a "dummy variable" based on work done by La Porta et al (1996). This work divided countries into four legal traditions: English, French, German, and Scandinavian. The English legal tradition is also referred to as common law, while the others can be grouped

together as civil law. Any country with English or common law was assigned a score of one in legal tradition, while any country with civil law was assigned a score of zero.

Similarly, capital market development in general and VC activity in particular is also dependent on the level of transparency in a country. Transparency is a key component for promoting the investor protections that La Porta et al (1996) argue contribute to the success of firms in procuring external financing. A country lacking transparency can only offer limited protection for outside investors and thus will be dependent on internal investors or the state to finance firms. Since outside investors contribute a large part of the capital utilized by venture capital funds, those nations lacking transparency will have a more difficult time attracting funds and thus establishing an active venture market. In addition, the lack of transparency fosters an environment more conducive to the inefficiencies that arise due to the presence of asymmetric information and moral hazard.

Table 2

Transparency Measures

Country	Rule of Law	Corruption	Risk of Expropriation	Risk of Contract Repudiation	AVERAGE	Dummy Value
U.S.A.	10	10	9.98	9	97.450%	1
U.K.	10	8.57	9.71	9.63	94.775%	1
Ireland	8.75	7.8	9.67	8.96	87.950%	0
Finland	10	10	9.67	9.15	97.050%	1
Germany	9	9.23	9.9	9.77	94.750%	1
France	8	8.98	9.65	9.19	89.550%	0
Italy	6.75	8.33	9.35	9.17	84.000%	0
Spain	6.25	7.8	9.52	8.4	79.925%	0
Portugal	5.5	8.68	8.9	8.57	79.125%	0

In Table 2, we present the array of scores reproduced from La Porta et al (1996) for our sample of countries on four of these characteristics: rule of law, corruption, risk of expropriation, and risk of contract repudiation. These four scores were added together and divided by the total possible of 40 points to determine an average transparency index value for each country. Countries receiving 95% or higher are considered transparent and thus are assigned a value of one while countries receiving a score less than 95% are not considered transparent and are assigned a value of zero. A positive correlation should exist between those nations with high transparency index values and active venture capital activity.

3.1 Other Factors

The list of factors outlined above is by no means an exhaustive set of the determinants of VC market activity. However, modeling a complete set of factors for the variety of countries included here is plagued by data availability problems. Nonetheless, for the sake of intellectual completeness the discussion that follows outlines some additional variables that may affect venture capital activity but are not included in our study.

The presence of a developed market in high yield debt or junk bonds positively affects venture capital by providing an additional source of funds. The development of debt markets has been extremely important in the growth of European private equity activity. Before the introduction of a unified currency, the corporate bond market in most European nations was small or nonexistent. One of the major impediments working against the corporate bond market was the huge market for sovereign debt. These securities literally flooded the marketplace as several nations incurred enormous debt in order to finance fiscally irresponsible regimes. This left little investor appetite for corporate debt from solid companies with high credit ratings.

The implementation of the euro has improved this situation immensely. The Stability and Growth Pact that is a tenet of any EU nation has curtailed the amount of sovereign debt issued yearly. This should foster an environment more conducive to corporate bond offerings. The creation of the euro itself will greatly enlarge the investor pool by allowing most mutual and pension funds to invest in a variety of European opportunities without the foreign currency restrictions (World Bank 1997). These factors will combine to increase liquidity of the European bond market and thus the potential supply of venture capital funds.

The utilization of hybrid securities is another important component of the private equity marketplace. Hybrid securities, defined as assets that combine both elements of debt and equity in their structure and payoff charts, have been a cornerstone in venture capital and private equity investments. The flexibility inherent in the contract of hybrid securities is an important characteristic of the instrument. As noted above, many seed investments are faced with the dilemma of requiring capital with little to no cash flow in the near future. It may seem that the only option for an entrepreneur is the equity market. However, with equity financing his position and control over the company is then diluted or completely transferred to the equity investor. Hybrid securities offer an alternative that is intrinsically more attractive for the

entrepreneur and the investor. Research done by Hellmann (2000) makes a strong case for the link between the use of convertible securities and exit options. Hellmann examines the issue of control implicit in hybrid securities and the flexibility that it allows both investors and entrepreneurs in choosing an appropriate exit opportunity.

As noted above, Jeng and Wells (2000) investigate the effects of labor market rigidities on venture capital activity. Sahlman (1990) discusses how labor market rigidities form a large barrier to the success of venture capital investing in countries by reducing entrepreneurial activities that typically attract venture funding. For example, in Japan it is considered dishonorable to leave a corporation in order to start a new enterprise. In addition, the departing individual often loses valuable benefits. In economies with very rigid labor markets it would also be difficult for an individual to find new employment upon the failure of a new business. For these reasons, labor market rigidities are cited as an important reason why venture capital funding has not been more prevalent in Europe and Asia. However, our use of patents as a measure of innovation and entrepreneurship is intended to capture some of the impact of this variable.

4. Data and Methodology

4.1 Data

To examine the determinants of venture capital funding across our group of nine countries we employ panel data. The data series for the dependant variable, private equity funding per million dollars of GDP, was obtained from the European Venture Capital Journal for all countries other than the United States. Venture Economics provided the United States data. Venture capital investments refer to the total amount disbursed by venture capitalists for seed, start-up, and expansion stage investments. This measure is defined as total funds raised for all types of private equity investments, including funds committed but not yet paid, over the course of a year. Private equity funds raised represents a good proxy for venture capital funds raised, since it measures total capital available for all types of private equity investments. It is important to remember, however, that European nations could have relatively large private equity funds concentrating on management and leveraged buyouts rather than venture capital.

The IMF's International Financial Statistics Yearbook provides country GDP data. It is reported and accompanied by dollar exchange rates thereby facilitating the conversion of each

nation's GDP into dollars. The annual GDP deflator for each country is employed to convert each series to real values from which GDP growth rates are derived.

The measure of cost of capital also comes from the IMF's International Financial Statistics. The real lending rate, or the real rate that banks charge corporations to borrow money is utilized as our measure of the cost of capital. It best represents the real costs that a start-up company faces in its efforts to obtain external funding.

Equity market capitalization serves as our proxy for exit options available to venture capitalists. The statistics on equity market capitalization in each of the countries studied is from Global Financial Data.⁴ Capitalization in a nation's equity market serves as a proxy for the opportunity to exit a venture investment through an IPO. The size and liquidity of an economy's equity market may also be an important determinant of venture capital because it may proxy for alternative ways of raising private equity funds. Each country's equity market capitalization is divided by billions of dollars of GDP to adjust for the country size issue.

Data on the number of patents requested and granted is used as a proxy for innovation and regulatory hurdles or screening in an economy respectively. The yearly data for patents requested and patents granted comes from the World International Patent Organization. Once again in order to make cross-country comparison, patents requested in each country is divided by the nation's GDP in billions of dollars to find a measure of innovation per billion dollars of output. In addition, a percent of patents applied for and denied is calculated. The percent denied variable serves as a measure of regulatory hurdles present in a country, or the quality of patent screening. Due to the limited availability of patent data, only the sub-period 1994-1999 is examined when these variables are included in the model.

Finally, as noted in the previous section our institutional variables legal traditions, transparency, and intellectual property rights are operationalized as dummy variables. The exact metrics are presented in Section 3.

4.2 Methodology

This study uses a linear regression model to explore determinants of venture capital funding. The model makes use of pooled cross-sectional time series data in order to estimate the

⁴ Ireland Market capitalization data is the same as the United Kingdom due to the large number of Irish IPOs on the British exchange.

impact of specific variables on the level of venture capital activity in a given economy. The specification estimated is outline below:

$$Y_{ji} = \alpha + \beta X_{ji}$$

where, Y_{ji} = dollars of private equity raised/GDP
 X_{ji} = (1*6) matrix of explanatory variables
 j = year
 i = country

The X matrix represents our set of independent variables: GDP growth, the cost of capital, market capitalization, legal tradition, transparency, and intellectual property rights for the 1986-1999 sample. For a shorter sample, 1994-1999, patents applied for and the percent of patents denied are also included.⁵

This type of panel data is characterized by having repeated observations on fixed units, such as states or nations. As a result, both the temporal and spatial properties of time series cross sectional data make the use of ordinary least squares regressions problematic. In order to produce valid estimations of time-series cross sectional data, the major problems that occur in this type of empirical work must be considered. According to Beck and Katz (1995) many of the commonly used techniques for the analysis of time-series cross sectional data produce incorrect results. While the estimator of panel data will be unbiased, the resulting standard errors are often biased due to the presence of heteroskedasticity and/or serial correlation. These problems result in the inability to determine the statistical significance of the empirical estimators.

The problem of heteroskedasticity signifies inconsistency in the variance of the independent variables. The errors of a cross-national study may show heteroskedasticity because the scale of the variables differs between countries. For example, one would expect the changes in an independent variable to be larger for the observation in the United States than for, say, Ireland. To control for the problem of heteroskedasticity, two distinct measures were utilized. First, PE and market capitalization are reported as a percentage of billions of dollars of GDP. Operationalizing these variables as a ratio to GDP allows one to deal with the potential problems that could result from differences in scale between observations. In addition, White's test for heteroskedasticity is used to adjust the variance covariance matrix.

⁵ Inclusion of the additional variables implies that the X matrix has dimensions (1*8) for the sample 1994-1999

The other major concern with using ordinary least squares analysis is the possibility of certain time series problems such as serial correlation between observations. This results from the fact that variables tend to trend either up or down over time. This type of temporal dependence or persistence also jeopardizes the validity of the empirical results. The limited nature of the time span under study, 15 years for the full sample and 6 years for the later sub-period reduces the potential for major serial correlation problems. However, it might still be present. Therefore, each variable for each country was graphed and examined for first-order serial correlations before being included in the regression analysis. These graphs are available from the authors upon request. Generally, real GDP growth and real interest rates appear stationary. As can be seen from Figures 1-9, private equity only begins to trend upward in most countries after 1995 or 1996. Similarly, the market capitalization series in most countries only exhibits a noticeable trend after 1996.

5. Results

Table 3
Regression Results

Variable	1985-1999	1994-1999	1994-1999
Constant	1.39*** (.42)	1.63** (.76)	-2.92 (2.38)
Market Capitalization	.0000000294*** (.00000000637)	.0000000241*** (.00000000792)	.0000000288*** (.00000000761)
GDP Growth	-0.78 (1.57)	-9.28 (6.17)	-7.95 (6.49)
Cost of Capital	-11.59*** (4.12)	-13.15 (9.05)	-4.88 (9.92)
Int. Property Rights	0.22 (0.3)	0.27 (0.62)	1.18 (0.78)
Legal System	1.2*** (0.43)	2.44*** (0.95)	2.84*** (1.09)
Transparency	0.37 (0.27)	1.25** (0.61)	1.15* (0.62)
Patents Denied			3.79** (1.89)
Patents Granted			0.02 (0.02)
Adjusted R2	0.5	0.58	0.58
Durbin Watson	1.85	2	2.11

Standard errors in parenthesis

*** indicates a = .01 significance

** indicates a = .05 significance

* indicates a = .10 significance

all estimates are derived using White's test for heteroskedasticity

To test our hypothesis concerning the determinants of venture capital funding, we first estimate our model for the years 1985-1999, omitting the data on patents. The results are presented above in Table 3. Inspection of Table 3 reveals that our basic model captures fifty percent of the variance in venture capital funding.

Specifically, the model indicates that three variables are significant at the 99% confidence level: market capitalization, cost of capital, and legal systems. The coefficient corresponding with market capitalization of 2.94×10^{-8} indicates that for every \$1 million dollar increase in equity market capitalization, there will be a \$29 dollar increase in private equity funds raised. A large market capitalization signifies a more favorable financial environment. It

also signifies an increase of liquidity that serves both to make more funds available for venture capital investments and to provide opportunities for profitable exits. Therefore, increases in market capitalization make it easier for start-up companies to overcome liquidity constraints thereby promoting higher levels of VC activity.

Cost of capital is also a significant determinant at the 99% confidence level. The model predicts that as the real cost of capital increases, there is a decrease in the amount of private equity funds raised. The inverse relationship between the cost of capital and private equity activity is due to both the opportunity cost of investing and the risk inherent in a given market. As the cost of capital increases, there is a higher opportunity cost to private equity investing. In addition, a higher cost of capital indicates a high level of either country or overall market risk. These types of risk both discourage private equity investing. The coefficient for the cost of capital variable indicates that for a 1% increase in the real interest rate there will be a .11% decrease in private equity activity.

The results also show that a common law legal tradition is much more favorable to private equity investing. There are many reasons why common law legal traditions foster private equity. As La Porta et al (1996) state, this type of legal system affords more protection to both shareholders and creditors. Our results show that these types of protections are an essential component of maintaining an active private equity industry. This result is also consistent with the conjecture of Jeng and Wells (2000) that getting the basic legal structures in place is an important factor in aiding the development of private equity markets.

The second column of Table 3 presents the results from our model from the years 1996-1999, still omitting the patent data. Interestingly, in addition to the three variables discussed above, transparency is shown to be a significant determinant of private equity activity at the 95% confidence level. This result indicates that as the global economy has become more integrated during the 1990's and more of the funds raised for private equity investments come from abroad, transparency has become increasingly important. In today's environment of extraordinary capital mobility, investors seem to be reluctant to invest money in nations that lack an environment in which information is generally accurate and available.

The final column in Table 3 presents the results from our model during the years 1994-1999 including the data on patents. All of the factors discussed above remain significant determinants of private equity funding. In addition, patents denied are significant at the 95%

confidence level. The positive coefficient on the patents denied variable supports the screening hypothesis. Rather than serving as a proxy for regulatory hurdles in an economy, patents denied may represent the screening process involved in the issuing of patents. In this respect, the percent of patents denied serves to ensure that money spent on venture capital flows into meaningful patents. The higher the percent of patents denied, the bigger the potential payoff for those companies that are able to secure a patent. This corresponds with the conclusion of Gompers and Lerner (1999a) that venture backed patents are of a higher quality than non-venture backed patents.

It may be important to note that examination of the patent data indicates that the percent of patents denied remains steady or increases over time for every country but the U.S. In the United States, changes in patent laws have allowed for the patenting of industrial processes and intellectual ideas. It is possible that this proliferation of patents might not be conducive to future American private equity investing by diminishing the returns to future patents. This may eventually stifle innovation and reduce long-term growth by slowing down the flow of funds into the US private equity marketplace and the accumulation and integration of ideas.

6. Conclusions

Private equity and venture capital market development varies significantly even among the most developed economies. The goal of this study is to provide insight into why this might be the case. Our model quantifies the impact of various economic and politico-institutional factors on the level of private equity funding in an economy.

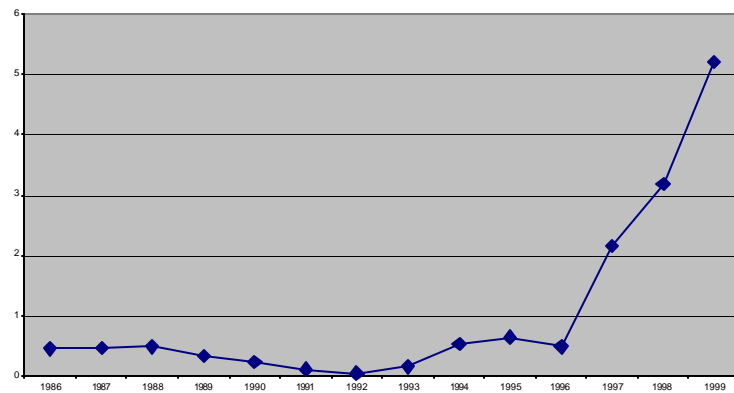
The results clearly indicate that market capitalization, the cost of capital, and legal traditions are the most powerful variables in explaining the variation in private equity market development between countries. The importance of market capitalization and profitable exit strategies confirms the conventional wisdom on venture capital market development put forth by Jeng and Wells (2000), Black and Gilson (1997) and Ritter (1998). The importance of legal traditions to the level of PE funding is consistent with the work of La Porta et al (1996) which suggests that institutional features play an important role in financial sector development. The cost of capital also negatively affects venture capital funding. The higher the real interest rate, the higher the opportunity cost to making a PE investment and as a result the lower the level of private equity funds raised.

In addition to the variables which are significant for the entire time frame, both market transparency and patents denied are significant determinates of private equity funding in the 1996-1999 sample period. These results indicate that the importance of transparency has increased in recent years. The increasing importance of transparency can be explained by the globalization of capital markets and the heightened competition for funds that this development has engendered. The significant and positive coefficient for the patents denied variable suggest that greater enforcement of patent regulation and increased screening helps preserve high rates of return for those ideas that do receive a patent thereby fostering VC investments.

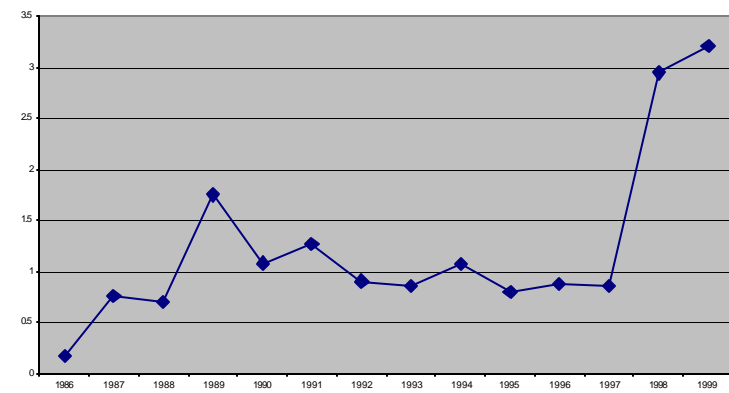
In addition to the statistically measurable factors noted above, specific details of government institutions, regulation, taxation, and culture also affect the level of venture capital funding. As Jeng and Wells (2000) note getting the basic legal and tax structures into place is an important factor in aiding the development of a private equity marketplace. The United Kingdom and the United States epitomize countries with good basic regulations and institutional arrangements that have high levels of private equity funding. Governments can play a role in fostering growth in private equity investing either through direct funding or by influencing the growth of other sources of funds. During the 1990's governments in Finland, Germany, and Italy all followed America's lead by increasing the ability of pension funds and endowments to invest in venture capital. Thus, future research might focus on better methods of quantifying and assessing the importance of the institutional infrastructure that underpins financial market activity.

Private Equity Funds Raised (in millions/ GDP)

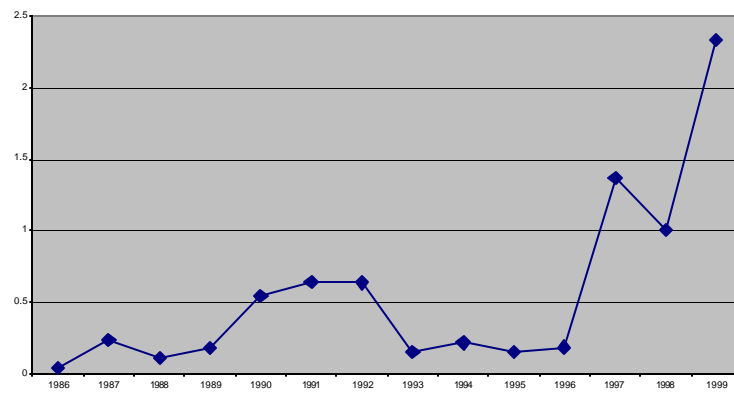
Finland (Figure 1)



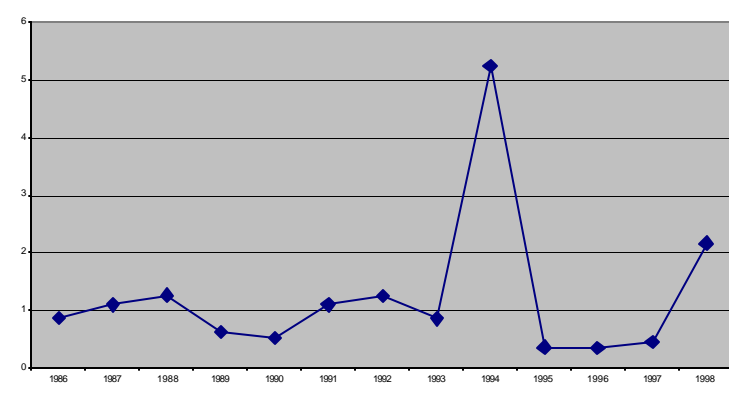
France (Figure 2)



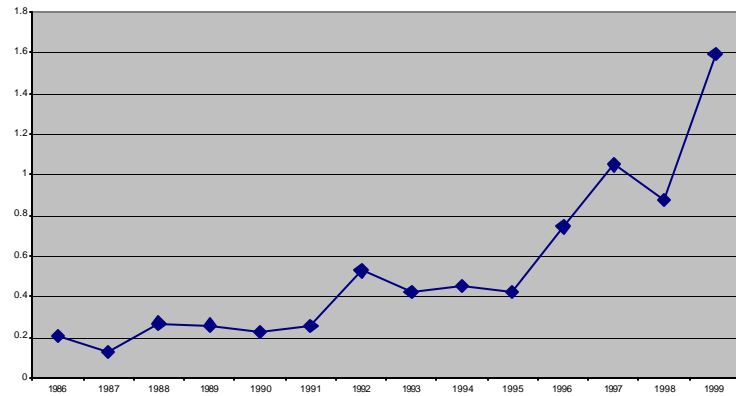
Germany (Figure 3)



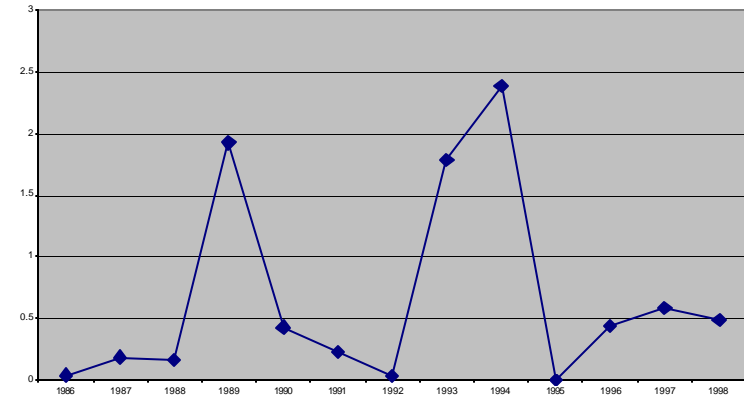
Ireland (Figure 4)



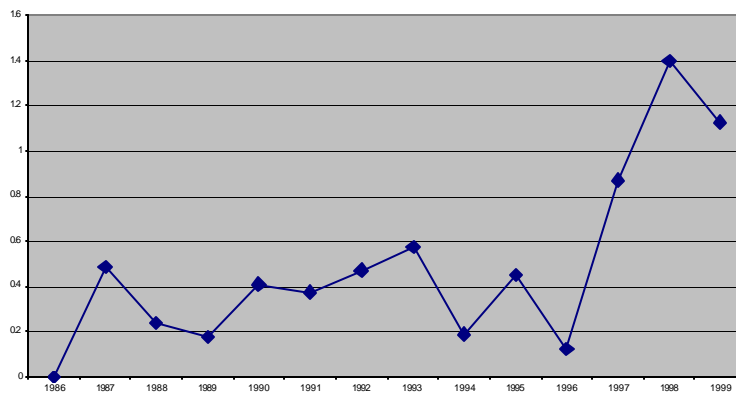
Italy (Figure 5)



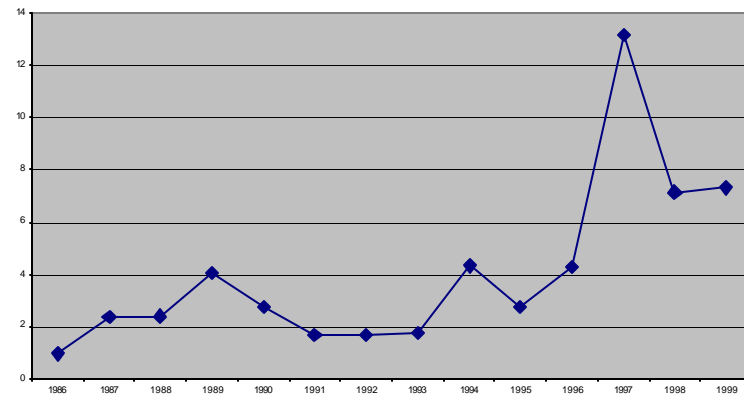
Portugal (Figure 6)



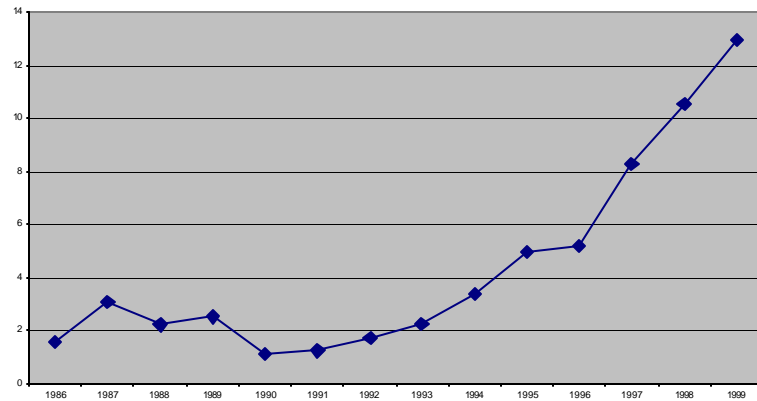
Spain (Figure 7)



United Kingdom (Figure 8)



United States (Figure 9)



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