Essays on Investing in Private Equity: Recommitment Strategies, Fund Persistence and Fund Raising Determinants in Asia

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Abstract

This thesis deals with practical issues when investing in private equity. The first essay offers investors a strategy how to recommit to achieve their desired allocation to the asset class. Recommitments are advised to be composed of 1) distributions and 2) commitments that are not expected to be called anymore, both weighted by the inverse of the actual investment degree, and 3) the amount necessary to rebalance the asset classes to the strategic asset allocation. Historical simulations show that investment degrees in the range of 0.7 to 0.8 can be attained.

The second essay addresses the selection of individual funds and discusses whether past top-quarter performance can be seen as an indication of future outperformance and whether investing in outperforming GPs can be implemented in practice? Empirical evidence on private equity return persistence shows mixed results. Further, implementing an approach based on past performance is difficult as subsequent funds are raised before previous funds’ performance can be accurately measured. In the end, a holistic due diligence process might offer the best insights on the factors that in the end determine success or failure of managers and give investors the best indication to find top quartile GPs.

The third essay deals with the fact that investors not only try to choose the best performing GPs, but also try to diversify their investments geographically. As investors are increasingly interested in emerging markets, the essay examines the determinants of private equity market activity and shows the differences of drivers in Asia compared to developed markets. Exit opportunities and the amount of credit provided by the banking sector are strong drivers. Unlike in developed markets, emerging markets are negatively impacted by the amount of credit provided by the banking sector. Funding of transactions may stand in direct competition with banks, explaining the negative relationship with credit provided by the banking sector.
Abstract (Deutsch)

Diese Dissertation befasst sich mit aktuellen Fragestellungen rund um Investitionen in Private Equity. Der erste Artikel bietet Investoren einen strategischen Ansatz zur Erreichung der gewünschten Asset Allokation. Es wird empfohlen, neue Commitments einzugehen in Höhe der 1) Ausschüttungen, 2) der nicht mehr abgerufenen Commitments, beide gewichtet mit dem inversen Investitionsgrad, sowie der Differenz zur gewünschten Asset Allokation im Portfoliokontext. Historische Simulationen belegen, dass mit diesem Ansatz ein Investitionsgrad in der Höhe von 0.7 bis 0.8 erreicht werden kann.


Investoren sind nicht nur auf der Suche nach den besten Fonds, auch die geografische Diversifikation nimmt einen zunehmenden Stellenwert ein: Der dritte Artikel untersucht die Erfolgsfaktoren der Private Equity Aktivität und zeigt Unterschiede in Asien als führendem Entwicklungsland für Private Equity im Vergleich zu entwickelten Ländern auf. Verkaufsopportunitäten sowie der Anteil der zur Verfügung gestellten Bankkredite stellen sich als wichtigste Faktoren heraus. Entgegen der Situation in entwickelten Ländern sind die Entwicklungsländer negativ korreliert mit Bankkrediten.
1 Introduction

The essays of this PhD thesis deal with practical issues in private equity that came up during my professional career within the industry. Investments in private equity have grown tremendously over the last decade and have become a key asset class for institutional investors. Despite the success of the asset class however, uncertainty how to deal with private equity is still widespread and investors help themselves with rules of thumb rather than with substantiated methods. The academic approach taken in this thesis helps to reduce that uncertainty and improves investors’ investment approaches towards private equity.

The first essay deals with an essential decision for investors that allocate a specific part of their assets to private equity: *How much should I commit to private equity in order to end up with a specific asset allocation?* To invest in a private equity fund, investors (also called Limited Partners, or "LPs") commit a certain amount of capital to the fund for a prolonged period of time. Commitments are irrevocable and are only gradually invested ("called") over a period of several years at the discretion of the funds’ management (General Partners, or "GPs"). It is important to differentiate between money that is committed and money that is actually invested by the GPs as only the latter is actually a cash outflow for the investor and is regarded as the basis for the calculation of the performance for the asset class. Normally, not all committed capital is called, as payouts from disinvestments ("distributions") typically start to occur when a fund is only just a few years old, often before all committed capital has been invested [Zwart et al., 2007, 2012].

If an investor commits too little, the investment in private equity from a portfolio perspective is below his intended asset allocation and the asset class may never deliver its intended investment characteristics. If too much is committed, the investor may face liquidity pressures in funding prior commitments or needs to liquidate otherwise attractive positions at significant cost in a fire sale [Pinebridge, 2013]. Furthermore,
additional claims against the defaulting investor for losses resulting from default may follow and the investor’s reputation may suffer [Zwart et al., 2012]. A commitment strategy that allows an investor to be consistently invested at the targeted allocation is therefore just as important as the decision on the initial private equity allocation itself. The first essay offers investors a dynamic rule on how to handle the recommitments to private equity.

So far, no active management strategy has been pursued. Investments have been allocated to the universe of private equity investment funds. However in practice, investors still pay a lot of attention to the "top quartile label" proudly promoted by a continuously growing number of GPs when deciding on their private equity fund investments. The second essay addresses the research question whether past top-quarter performance is indeed an indication of future outperformance and whether such an approach can be implemented in practice?

In a seminal paper on private equity returns, persistence and capital flows Kaplan & Schoar [2005] look at 764 private equity funds between 1980 and 2001. They show that average fund returns (net of fees) approximately equal the S&P 500. Further, Kaplan & Schoar [2005] document that better past returns are associated with better future returns (and vice-versa). That relationship was not expected as for mutual funds no persistence could be detected for the better performing funds. Persistence for mutual funds could be detected only for the worst performing funds (see Carhart [1997]; Berk & Tonks [2007]). However, for private equity funds, top quartile fund managers of predecessor funds appeared in the top quartile with their successor funds for both buyout funds and venture capital. Kaplan & Schoar [2005] explain persistence by heterogeneity in GP skills and limited scalability of human capital. It remains puzzling however that these returns to superior skills are not appropriated by the scarce input, i.e. the GPs, in the form of higher fees. Several subsequent studies attempt to rationalize this phenomenon (see Glode &
Green [2008]; Hochberg et al. [2010]; Marquez et al. [2010]).

The findings on persistence by Kaplan & Schoar [2005] initiated further empirical research on the relationship between predecessor and successor private equity fund performance (see Conner [2005], Rouvinez [2006], Phalippou [2009], Paresys [2010], Chung [2012] or Harris et al. [2013]). The essay critically evaluates the empirical evidence on return persistence for private equity funds and discusses the feasibility of a practical implementation of such an approach.

Investors not only try to choose the best performing GPs, they also try to diversify their investments geographically. As investors are increasingly interested in emerging markets private equity, the third essay aims to foster understanding on the determinants of private equity market activity and to show the differences of drivers in Asia compared to developed markets. While drivers for private equity in the developed world are quite similar across countries, developed markets show substantial differences compared to developed countries. Understanding and awareness of these differences is critical for investors to invest in these markets. Only when the determinants and particularities are known, investors can adequately assess the risks and attractiveness of emerging markets, while on the other side policymakers can promote and stimulate the asset class in order to profit from a vibrant private equity market. A clear understanding of practicalities and pitfalls is critical, as market growth alone never guarantees investment success.

Numerous both theoretical and empirical research on the determinants of private equity fundraising has identified various drivers behind private equity activity for developed countries. Studies in the field use funds raised as a measure of private equity activity and are mostly related to the United States (U.S.) [Black & Gilson, 1998; Michelacci & Suarez, 2004; Gompers & Lerner, 2000; Lerner & Schoar, 2005; Kaplan & Schoar, 2005] and to a minor degree on Europe [Jeng & Wells, 2000; Balboa & Pellón, 2003]. Research with regard to emerging economies is
scarce. Some research has been performed on transition countries such as Central and Eastern Europe (CEE). Farag et al. [2004] focus on the private equity markets in Hungary, the Czech Republic and Poland, and compare them with Germany. The major disadvantage of these countries is seen in the availability of managerial talent to manage the private equity backed companies. This is consistent with the findings of Bliss [1999], Karsai & Wright [1998] and Klonowski [2007] with regard to CEE countries and with Groh & Liechtenstein [2011] for a wider selection of emerging economies. Johnson et al. [1999], Klonowski [2007] and Groh & Liechtenstein [2011] emphasize the importance of the protection of property rights while their findings suggest that access to debt financing does not appear to explain differences in levels of fundraising. Furthermore, the availability of public funding and subsidies play no role in fundraising (not only in emerging countries): Public money does not attract private money [Groh & Liechtenstein, 2011; Rin et al., 2005; Armour & Cumming, 2006; Groh & Liechtenstein, 2011]. The essay builds on that research and analyses the various effects of socio-economic criteria on private equity activity in Asia compared to developed markets with panel data models: The results are surprising and confirm the importance of a deep and thorough understanding of the market before investors start to diversify towards emerging markets.

All essays have been published in well known publications within the private equity industry. The essay "Return Persistence: Finding Top Quartile Managers" was published in a collected edition of current academic research on Private Equity by Oxford University Press under the title "Private Equity - Opportunities and Risks" (ISBN: 9780199375875). Both the essays "Private Equity Asset Allocation: How to Recommit?" (Spring 2015, Vol. 18, No. 2, pp. 9-22) and "Private Equity in Emerging Markets: Drivers in Asia Compared with Developed Countries" (Summer 2014, Vol. 17, No. 3, pp. 45-61) were published in the Journal of Private Equity, a renowned peer-reviewed academic journal covering strategies
and techniques in private equity and venture capital investing (Editorial Board: Josh Lerner, Steven N. Kaplan, Paul A. Gompers et al.). A further essay on "The Implications of Fair Value Accounting Standards on Private Equity Buyout Returns" was also published in the Journal of Private Equity (Winter 2012, Vol. 15, No. 4, pp. 55-78) but is not part of this PhD thesis.
References


"Private equity investors need to consider a strategic commitment plan to achieve allocation targets as much as setting the targets themselves. While the challenges in establishing a commitment strategy are many, it is an endeavor well worth the attention, time and effort."

Pinebridge

2 First Essay:
Recommitting to Private Equity

Abstract

For institutional investors in private equity, a recommitment strategy to achieve a desired asset allocation is at least as important as the decision on the asset allocation itself. As cash flows (both capital drawdowns and distributions) for the asset class are highly unpredictable upfront, achieving the desired allocation in a portfolio context represents a multi-period dynamic optimization problem. My approach determines new commitments to private equity funds based on distributions, the amount needed to adjust asset classes’ weights back to the desired portfolio asset allocation ("rebalancing amount"), as well as the current investment degree of the portfolio. Annually recommitting distributions and the rebalancing amount - both weighted by the inverse of the current period investment degree - optimises institutional investors’ private equity asset allocation.

Keywords: Private Equity; Recommitment; Asset Allocation; Alternative Assets
JEL Classification: C53, G11, G23, G24
2.1 Introduction

Achieving a desired asset allocation for the private equity portion of an institutional investor’s portfolio is complex. To invest in a private equity fund, investors (also called Limited Partners, or "LPs") commit a certain amount of capital to the fund for a prolonged period of time. Commitments are irrevocable and are only gradually invested ("called") over a period of several years at the discretion of the funds’ management (General Partners, or "GPs"). Normally, not all committed capital is called, as payouts from disinvestments ("distributions") typically start to occur when a fund is only just a few years old, often before all committed capital has been invested [Zwart et al., 2007, 2012]. In the end, the true exposure of an investor to the asset class is the capital that is actually invested ("investment degree"), not the amount being committed upfront. The investment degree is therefore the key figure, which an investor’s recommitment decisions should be based upon to achieve the desired allocation to private equity.

The time lag between capital commitments and actual investments, as well as the uncertainty with regard to timing and size of distributions, makes reaching a desired asset allocation a complex endeavour. Reaching the desired allocation however is critical to obtaining the major benefits associated with the asset class, which an investor aims to include in the portfolio: 1) typical private equity return characteristics, 2) lower correlation with other asset classes resulting in lower total portfolio volatility, as well as 3) tax efficiencies compared to publicly traded securities.

A commitment strategy that allows an investor to be consistently invested at the targeted allocation is therefore just as important as the decision on the initial private equity allocation itself. Private equity is a highly illiquid asset class: A secondary market that offers investors an opportunity to sell pre-existing commitments is only recently emerging. Even if the investor may be able to sell the position in the secondary market - typically at a significant discount - transaction costs are very high, making this exit strategy an act of last resort [Siegel, 2008].
If an investor commits too little, the asset class may never deliver its intended investment characteristics. If too much is committed, the investor may face liquidity pressures in funding prior commitments or need to liquidate otherwise attractive positions at significant cost in a fire sale [Pinebridge, 2013]. Furthermore, additional claims against the defaulting investor for losses resulting from default may follow and the investor’s reputation may suffer [Zwart et al., 2012]. An investor’s reputation however provides access to the best GPs and is therefore of utmost importance [Oberli, 2014].

In the light of all of the above reasons, the private equity allocation process can be regarded as a multi-period dynamic portfolio optimization problem, in which each period requires a decision on new capital commitments ("recommitments") to private equity funds, which in turn affect the level of investments in future periods [Zwart et al., 2012]. An efficient recommitment strategy mitigates the opportunity costs in the case of underinvesting, as well as cash shortages in the case of over-investing.

So far, recommitment strategies have received limited attention in academic research (see Table 2.1). Existing studies and industry practice mainly build on predetermined rules of thumb, lack flexibility and adaptability to the actual situation of the portfolio. Cardie et al. [2000] suggest "to commit the entire specified private equity allocation to a new fund-of-funds every other year, or one half the allocation each year". Such an approach however does not consider existing private equity portfolio positions when making new commitments and neglects past portfolio developments.

Nevins et al. [2004] build their approach on committed capital. They set a target for committed capital based on average rates of distributions and commitments. If actual committed capital falls below the target, new commitments should be made equal to the difference between the two. The underlying assumptions of constant rates of distributions and
<table>
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<tr>
<td>Cardie et al. [2000]</td>
<td>Commit the entire specified private equity allocation to a new fund-of-funds every other year or one half the allocation each year. Simulation based on industry averages of 1993-2000.</td>
<td>Historical simulation</td>
<td>Within five years, 90% of the asset allocation goal can be met. This allocation gradually increases over time, reaching the target and remaining within the range by about year ten.</td>
<td>Unrealistic, stable assumptions: Expected cash flows of a &quot;typical&quot; private equity fund are assumed. Real private equity portfolio positions should be considered when making new commitments.</td>
</tr>
<tr>
<td>Nevins et al. [2004]</td>
<td>Target for committed capital based on average rates of distributions and commitments. Once the committed capital target is calculated, decisions regarding new commitments are made systematically. If the actual committed capital falls below the target, new commitments should be made equal to the difference between the two.</td>
<td>Monte Carlo simulation</td>
<td>Targeted allocation for 10% allocation to private equity for committed capital is 17%. Invested capital reaches within 1% of the 10% target by the second year of the simulation and then converges completely.</td>
<td>Underlying assumption of constant rates of distributions and contributions across all private equity funds and over time highly unrealistic. Neglects past portfolio developments.</td>
</tr>
<tr>
<td>Zwart et al. [2012]</td>
<td>New private equity commitments equal to last quarter’s received distributions plus un-called capital from old commitments, assumed not to be called anymore, scaled by the ratio of the specified allocation to the current private equity allocation.</td>
<td>Historical simulation</td>
<td>Strategy, on average, realized 86% of the target allocation, while keeping the probability of being overinvested low (8%). Sensitivity analyses: Strategy remains successful when the portfolio is restricted to a certain private equity segment (buyout or venture capital), specific region (the United States or Europe), or varying fund manager experience (first-time or follow-on funds).</td>
<td>100% private equity portfolio, ignoring the dynamics of a portfolio with other asset classes. No consideration of bias in private equity databases.</td>
</tr>
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contributions across all private equity funds and over time however is highly unrealistic as descriptive statistics illustrate later on.

Compared to Cardie et al. [2000] and Nevins et al. [2004], who use predetermined rules based on average fund data and neglect the dynamics of portfolio investments, this essay builds on a dynamic approach applied by Zwart et al. [2012], who set new commitments equal to the previous quarter’s received distributions, scaled by the ratio of the desired allocation to the current private equity allocation. Zwart et al. [2012] consider a 100% private equity portfolio while ignoring the dynamics of a portfolio with other asset classes such as stocks and bonds. These other asset classes do not co-vary perfectly with private equity investments however and are not traded on a regular basis. This is where this essay builds upon and develops a dynamic recommitment strategy for a private equity allocation in a portfolio context. In this light, I address the research question of how to manage capital commitments to private equity funds in a portfolio context to build up, as well as to maintain, a desired allocation to the asset class? Not only does this essay extend the approach of Zwart et al. [2012] to include other asset classes and implementing the approach in a portfolio context, it also uses a more balanced database. The dataset used for this essay compares the data used by Zwart et al. [2012] to data of other providers of private equity data in order to detect behavioral biases. Differences with regard to unusually high and constant residual values of funds are detected that should long have been liquidated ("living dead investments").

The essay further avoids the uncertainties with predicting future portfolio developments and pursues an approach where recommitments are based exclusively on figures that are available at the time of the recommitment decision, rather than on cash flow prediction models (for examples, see Takahashi & Alexander [2002] and Malherbe [2005])\(^1\). Commitments

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\(^{1}\)These models assume future funds have the same pattern of capital contributions, distributions, and asset values as historical averages, and they are not dynamic in that sense.
in my approach are dynamic - i.e. reflect the current state of the portfolio - and are determined each period by actual distributions, the amount restoring the targeted portfolio asset allocation ("rebalancing amount"), as well as the current investment degree of the portfolio.

Distributions in my approach are weighted by the inverse of the investment degree and are recommitted annually. The rebalancing amounts are also recommitted to new private equity funds ("vintages") annually. The required annual recommitment is set at a floor of 15% of the total private equity allocation of the portfolio to ensure vintage year diversity and continuing access to the best GPs\(^2\).

By implementing this formula, results based on historical simulations show that investment degrees in the range of 0.8 can be attained, i.e. between 70% and 80% of total capital allocated to private equity would actually be invested. During the typical "boom and bust cycles" however, investment degrees can fluctuate significantly. In boom times, investments could be exited quickly and at high prices, generating high distributions for investors to recommit. Due to the time lag between commitments and actual investments however, the investment degree falls at first. As boom turns into bust, distributions and recommitments decrease, while the GPs continue drawing down capital to fund investments and to pursue attractive investment opportunities. As a consequence, the investment degree is augmented.

Introducing additional overcommitment to the recommitment approach increases the investment degree at the risk of not being able to meet capital calls with the allocation to the asset class. An additional overcommitment of 50% leads to an investment degree of around 0.9 from the mid 2000's onwards and increases the overall investment degree for a portfolio initiated in 1983 from 0.73 to 0.89. While such overcommitment behavior might make sense for an institutional investor with a portfolio of other liquid asset classes that could temporarily cover the private equity

\(^2\)Access to these GPs might be restricted if an investor stalls new commitments during a prolonged period of time and therefore damages the relationships with top GPs built over a long time.
capital calls, that decision has to be taken with regard to the needs and circumstances of investors on an individual basis.

The essay is organised as follows. Section two presents the database and corresponding descriptive statistics. The following section develops the recommitment strategy and explains the methodology. Section four tests the strategy and presents as well as discusses empirical results. Section five concludes.

2.2 Data

The focus of this essay is on the U.S. market for private equity as it combines most of the allocated capital to the asset class worldwide and offers the longest accessible time range, enabling one to empirically validate the recommitment strategy over a time range of three decades. Due to the deal size needed for institutional investors’ portfolios, the recommitment approach places emphasis on buyout funds. I assume that the decision on the strategic asset allocation has been specified in advance and investments are made indirectly through private equity funds rather than direct investments in portfolio companies.

2.2.1 Data Source

The dataset used for this essay is comparable to Jones & Rhodes-Kropf [2003]; Kaplan & Schoar [2005]; Phalippou & Gottschalg [2009]; Zwart et al. [2012] and was obtained from the most comprehensive source of financial performance of U.S. private equity data, Thomson Reuters’ private equity module ("ThomsonONE")\(^3\). Data include 30 years of quarterly drawdowns, distributions, and net asset values ("NAVs") for 680 private equity buyout funds from the first quarter of 1983 until the end

\(^3\)Thomson Reuters’ private equity module, formerly called VentureXpert or Thomson Venture Economics, is available as an add-on to ThomsonONE.com Investment Banking and includes over 30 years of daily-updated history covering buyouts, private equity funds, firms, executives, portfolio companies and limited partners around the world.
of 2013\textsuperscript{4}. Reported cash flows are in USD net of management fees, performance fees, as well as other costs.

Data for publicly traded securities to simulate the correlation dynamics of a private equity allocation in the portfolio context were retrieved from Bloomberg and include the Wilshire 5000 for public equities and the Barclays U.S. Aggregate Bond Index for bonds.\textsuperscript{5}

In order to address potential biases associated with databases on private equity data,\textsuperscript{6} the dataset is compared to other providers of private equity data. Differences with regard to unusually high and constant residual values of funds are detected that should long have been liquidated ("living dead investments") \cite{ljungqvist2003, phalippou2009, stucke2011, harris2014}.

Generally, the life of a private equity fund is ten years with the option of one or two 12-month extensions. Stucke \cite{stucke2011} explains these residual values with missing updates as figures provided by ThomsonONE are systematically higher than those by Cambridge Associates, Preqin, Burgiss and public reporting institutions ("PRI")\textsuperscript{7}, all of which show a pattern that one would expect, i.e., a strictly monotonic decrease in residual values after a fund’s divestment phase. In line with the considerations of existing research and the general life of a private equity fund, constant residual values are written off and regarded as a cash inflow after a fund

\textsuperscript{4}Funds-of-funds and mezzanine funds are not included as their structures differ from direct private equity funds

\textsuperscript{5}Prior to Lehman Brothers’ collapse in 2008, the index was known as the Lehman U.S. Aggregate Bond Index and measures the performance of investment grade bonds in the United States. The index currently includes U.S Treasuries, government-related issues, corporate bonds, agency mortgage-backed pass-throughs, consumer asset-backed securities, and commercial mortgage-backed securities.

\textsuperscript{6}For databases which source their information solely from GPs, poor performing GPs could be expected to try to avoid negative publicity and opt not to report their data. One might also argue that GPs with unfavorable performance should have, at least, a joint interest to share their performance data to avoid a positive selection bias of the benchmark, which would hit them particularly hard \cite{stucke2011}. On the other side, strong performing GPs might not provide data in order not to raise the average. These successful GPs might further have no need for publicity as they are already well oversubscribed. For a more detailed analysis on the reporting biases see e.g. Stucke \cite{stucke2011}; Kaplan \& Schoar \cite{kaplan2005}.

\textsuperscript{7}PRIs include CalPERS, Washington State Board and University of California
reaches year twelve as do Ljungqvist & Richardson [2003].

2.2.2 Descriptive Statistics

Table 2.2 gives an overview on the funds included in the dataset. Funds are reported according to the year in which they have been raised ("vintage"). The average maximum investment degree and timing for vintage years 2011-2013 are unreliable because the maximum and timing cannot yet be determined with certainty. Committed capital to buyout funds increased enormously during the past three decades, reaching a fundraising record of over 114 billion USD committed in 2006 to 32 newly raised buyout funds. The figures on the funds in the dataset also show a pronounced cyclical behavior of the industry ("boom and bust cycles"). Commitments, the investment degree, as well as cumulative contributions and distributions decrease noticeably for vintages raised during an economic downturn - while on the other side the maximum investment degree is reached later on in the funds' lifetime. These variations in cash flows over various vintages underline the need to pursue a dynamic approach towards recommitting to new funds, rather than an approach based on historical averages.

Figure 2.1 and Figure 2.2 show the typical cash flow pattern of private equity funds. During the first few years of a new fund, investor capital is drawn down and invested. After the initial investment years, first distributions start to occur, while contributions decrease. Capital that is called to finance investments and to cover GP fees peaks in year four. After that, as the fund begins to exit investments, distributions increase - turning into positive cash flows for investors in the fund. This results in the typical cash flow pattern, also known as the "J-curve", represented by the dotted line in Figure 2.2.

As mentioned before, the true exposure of an investor to the asset class is the capital that is actually invested and is generating returns for the investors, not the amount being committed upfront. The investment degree, i.e. the fraction of total allocated capital that is actually invested
Table 2.2: Timing and Magnitude of Investment Degree across Vintage Years

<table>
<thead>
<tr>
<th>Year</th>
<th>Funds</th>
<th>Commitment</th>
<th>ID</th>
<th>Timing</th>
<th>CC_{t=4y}</th>
<th>CD_{t=4y}</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>4</td>
<td>1.316</td>
<td>0.29</td>
<td>Q 10</td>
<td>0.32</td>
<td>0.58</td>
</tr>
<tr>
<td>1984</td>
<td>7</td>
<td>1.662</td>
<td>0.90</td>
<td>Q 8</td>
<td>0.99</td>
<td>0.41</td>
</tr>
<tr>
<td>1985</td>
<td>7</td>
<td>1.297</td>
<td>0.57</td>
<td>Q 11</td>
<td>0.75</td>
<td>0.61</td>
</tr>
<tr>
<td>1986</td>
<td>10</td>
<td>1.877</td>
<td>0.68</td>
<td>Q 7</td>
<td>0.85</td>
<td>0.46</td>
</tr>
<tr>
<td>1987</td>
<td>23</td>
<td>6.854</td>
<td>0.61</td>
<td>Q 13</td>
<td>0.83</td>
<td>0.39</td>
</tr>
<tr>
<td>1988</td>
<td>16</td>
<td>8.449</td>
<td>0.67</td>
<td>Q 20</td>
<td>0.76</td>
<td>0.22</td>
</tr>
<tr>
<td>1989</td>
<td>25</td>
<td>5.878</td>
<td>0.61</td>
<td>Q 21</td>
<td>0.64</td>
<td>0.10</td>
</tr>
<tr>
<td>1990</td>
<td>10</td>
<td>2.652</td>
<td>0.74</td>
<td>Q 20</td>
<td>0.76</td>
<td>0.18</td>
</tr>
<tr>
<td>1991</td>
<td>5</td>
<td>1.440</td>
<td>0.67</td>
<td>Q 18</td>
<td>0.80</td>
<td>0.18</td>
</tr>
<tr>
<td>1992</td>
<td>13</td>
<td>4.210</td>
<td>0.60</td>
<td>Q 13</td>
<td>0.79</td>
<td>0.34</td>
</tr>
<tr>
<td>1993</td>
<td>20</td>
<td>9.688</td>
<td>0.71</td>
<td>Q 16</td>
<td>0.85</td>
<td>0.29</td>
</tr>
<tr>
<td>1994</td>
<td>24</td>
<td>10.556</td>
<td>0.50</td>
<td>Q 18</td>
<td>0.68</td>
<td>0.30</td>
</tr>
<tr>
<td>1995</td>
<td>25</td>
<td>19.063</td>
<td>0.72</td>
<td>Q 19</td>
<td>0.84</td>
<td>0.19</td>
</tr>
<tr>
<td>1996</td>
<td>24</td>
<td>11.065</td>
<td>0.76</td>
<td>Q 17</td>
<td>0.80</td>
<td>0.16</td>
</tr>
<tr>
<td>1997</td>
<td>36</td>
<td>30.709</td>
<td>0.65</td>
<td>Q 18</td>
<td>0.77</td>
<td>0.22</td>
</tr>
<tr>
<td>1998</td>
<td>54</td>
<td>48.784</td>
<td>0.72</td>
<td>Q 14</td>
<td>0.80</td>
<td>0.11</td>
</tr>
<tr>
<td>1999</td>
<td>36</td>
<td>28.675</td>
<td>0.60</td>
<td>Q 20</td>
<td>0.66</td>
<td>0.06</td>
</tr>
<tr>
<td>2000</td>
<td>50</td>
<td>53.453</td>
<td>0.47</td>
<td>Q 24</td>
<td>0.50</td>
<td>0.10</td>
</tr>
<tr>
<td>2001</td>
<td>28</td>
<td>30.753</td>
<td>0.51</td>
<td>Q 21</td>
<td>0.54</td>
<td>0.18</td>
</tr>
<tr>
<td>2002</td>
<td>21</td>
<td>18.254</td>
<td>0.57</td>
<td>Q 20</td>
<td>0.56</td>
<td>0.12</td>
</tr>
<tr>
<td>2003</td>
<td>16</td>
<td>20.107</td>
<td>0.61</td>
<td>Q 17</td>
<td>0.75</td>
<td>0.39</td>
</tr>
<tr>
<td>2004</td>
<td>21</td>
<td>20.402</td>
<td>0.64</td>
<td>Q 16</td>
<td>0.73</td>
<td>0.20</td>
</tr>
<tr>
<td>2005</td>
<td>33</td>
<td>51.788</td>
<td>0.73</td>
<td>Q 21</td>
<td>0.79</td>
<td>0.12</td>
</tr>
<tr>
<td>2006</td>
<td>32</td>
<td>114.035</td>
<td>0.81</td>
<td>Q 25</td>
<td>0.85</td>
<td>0.07</td>
</tr>
<tr>
<td>2007</td>
<td>37</td>
<td>108.094</td>
<td>0.60</td>
<td>Q 24</td>
<td>0.57</td>
<td>0.05</td>
</tr>
<tr>
<td>2008</td>
<td>27</td>
<td>74.106</td>
<td>0.55</td>
<td>Q 21</td>
<td>0.52</td>
<td>0.08</td>
</tr>
<tr>
<td>2009</td>
<td>10</td>
<td>20.758</td>
<td>0.67</td>
<td>Q 19</td>
<td>0.71</td>
<td>0.15</td>
</tr>
<tr>
<td>2010</td>
<td>12</td>
<td>16.955</td>
<td>0.53</td>
<td>Q 16</td>
<td>0.58</td>
<td>0.08</td>
</tr>
<tr>
<td>2011</td>
<td>27</td>
<td>59.250</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>2012</td>
<td>19</td>
<td>46.579</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>2013</td>
<td>8</td>
<td>21.174</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>1980s</td>
<td></td>
<td></td>
<td>0.62</td>
<td>Q 13</td>
<td>0.73</td>
<td>0.40</td>
</tr>
<tr>
<td>1990s</td>
<td></td>
<td></td>
<td>0.67</td>
<td>Q 17</td>
<td>0.78</td>
<td>0.20</td>
</tr>
<tr>
<td>2000s</td>
<td></td>
<td></td>
<td>0.62</td>
<td>Q 21</td>
<td>0.65</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Notes: For each year, this table reports the number of funds, total commitments (in million USD), the magnitude and timing of the maximum investment degree, as well as the cumulative contributions and distributions after four years ($CC_{t=4y}$ and $CD_{t=4y}$).
Notes: This figure shows the sample data annual calls and distributions both on an individual basis. Not all initial cash commitments are drawn down over a typical fund’s lifetime. For the sample period, fund commitments are drawn down by a maximum of 91%.

in the asset class at the end of quarter \( t(ID_t) \) is therefore the key figure, which an investor’s recommitment decisions should be based upon. It is defined for the purpose of this paper as

\[
ID_t = \frac{NAV_t}{NAV_t + Cash_t},
\]

where \( NAV_t \) for a private equity allocation is the sum of the NAVs of the underlying private equity fund investments and \( Cash_t \) is uninvested cash.

An investor aims for an asset class investment degree as close as possible to one or, vice versa, for the amount of cash to be minimized. Only with an optimized investment degree, the asset class actually delivers the risk and return characteristics on which portfolio allocation target weights have been based upon during the process of the asset allocation.
Figure 2.2: Cumulative Calls and Distributions, "J-curve"

*Notes:* This figure shows the cumulative calls and distributions. Commitments are typically drawn down over a number of years and distributions usually begin before all capital is called, resulting cumulatively in the typical private equity cash-flow pattern, also known as "J-curve".

Figure 2.3 shows that the maximum average investment degree for the individual funds as of the initial commitment in the sample peaks in year four at 60%. Taking into account the growth of the fund, Figure 2.4 represents the investment degree as a fraction of total fund value along with cash from distributions and initial cash from commitments. The maximum investment degree as of the total fund value peaks at 55%.

Considering the size and the evolvement of the average investment degree over time, an analytical approach towards recommitting to the asset class becomes of paramount importance in order to manage and optimize the investment degree.
2.3 Models and Methodology

A recommitment strategy to committing to new funds is key to achieve an optimized investment degree. The approach should be simple and sensible on a theoretical basis, while nonetheless respond to the actual current portfolio situation.

Based on Zwart et al. [2012], the recommitment approach I pursue here recommits cash that is returned to investors ("distributions, $D_t"\) to new funds each year. Recommitted distributions are weighted by the inverse of the current investment degree ("$ID_t\"), i.e. if the current investment degree is low, a higher amount would be committed to new funds. As a consequence, the investment degree increases. I assume that investors participate in every available fund. Active strategies, trying to
Figure 2.4: Invested Capital and Cash from Distributions as of Total Fund Capital

Notes: This figure shows the invested capital and distributions resulting from these investments in percent of the total fund capital which is the amount of capital committed upfront.

As descriptive statistics have illustrated, not the complete amount of committed capital is drawn down to the full extent. Therefore, I add commitments that are not drawn down after 6 years ("UC_{t-6}") to the above recommitments. This leads to total recommitments of

$$C_t = \frac{1}{ID_t}(D_t + UC_{t-6}).$$  \hspace{0.7cm} (2)

In line with a traditional asset allocation policy, the amount to rebalance the portfolio to a stated set of asset proportions is added at the end of every year ("rebalancing amount, RB_t").

With n asset classes, the amounts initially invested are $X_1, \ldots, X_n$. The initial value of the portfolio is

$$V_0 = \sum_i X_i$$ \hspace{0.7cm} (3)
and the initial asset proportions according to the asset allocation policy are

\[ \frac{X_1}{V_0}, \ldots, \frac{X_n}{V_0}. \]  

(4)

After one period has passed, the ratio of the ending value to beginning value for asset \( i \) is \( k_i \). The new values of the assets will therefore be

\[ k_1X_1, \ldots, k_nX_n \]  

(5)

with a portfolio value of

\[ V_1 = \sum_i k_iX_i \]  

(6)

and a value-relative for the portfolio \( K_p \) of

\[ K_p = \frac{V_1}{V_0}. \]  

(7)

With \( RB_1, \ldots, RB_n \) representing the amounts to rebalance a portfolio to meet the asset allocation targets, the goal is to select a set of positive, negative and possibly zero values for \( RB_1, \ldots, RB_n \) such that

\[ \frac{k_iX_i + RB_i}{V_1} = \frac{X_i}{V_0} \]  

(8)

for every asset \( i \). This requires that

\[ RB_i = (K_p - k_i)X_i. \]  

(9)

If an asset underperforms the portfolio as a whole, \( K_p - k_i \) will be positive. As the formula shows, the investor will purchase the asset, since \( RB_i \) will be positive. Such assets are relative losers [Sharpe, 2009]. The worse such an asset’s performance (that is, the smaller its value-relative \( k_i \)), the greater will be \( RB_i \), the amount purchased to rebalance a portfolio to a pre-specified set of asset proportional values. Conversely, if an asset outperforms the portfolio as a whole, \( K_p - k_i \) will be negative. The investor will sell the asset, since \( RB_i \) will be negative. Such assets
are relative winners.

Adding the amount to rebalance the portfolio to a pre-specified asset allocation, $RB_i$ is integrated into the recommitment approach as

$$C_t = \frac{1}{ID_t}(D_t + UC_{t-6}).$$ (10)

Purchasing and selling securities in amounts $RB_i$ that will make the new asset proportions equal to the initial policy proportions, result in

$$C_t = \frac{1}{ID_t}(D_t + UC_{t-6} + RB_i)$$ (11)

or equivalently

$$C_t = \frac{1}{ID_t}(D_t + UC_{t-6} + (K_p - k_i)X_i).$$ (12)

Looking at the private equity target allocation in the portfolios of institutional investors, there is a significant difference between European pension funds, with no or low single-digit allocations, and U.S. institutional investors with a desired allocation in the mid-teens (CalPERS, for example, at around 15%) to significantly over 20% (Yale University endowment fund at currently 31%)\(^8\). For this research, I assume a desired portfolio allocation of 10% private equity (buyout), 50% public equities, and 40% bonds. Sensitivity analyses show that the recommitment approach remains equally successful when asset allocations are altered.

Addressing the issue of the importance of building up and maintaining crucial relationships to GPs, the minimum of annual recommitments is set at a floor of 15% of the total private equity allocation of the portfolio. This ensures persistency in investing across fund vintages and avoids to hurt valuable relationships to successful and difficult to access GPs by not investing in their new rounds of fundraising.

The effectiveness of the recommitment approach is evaluated by means of historical simulation. Initial portfolios are formed beginning

\(^8\)Asset allocation targets for fiscal year 2014.
with first reliable data in 1983. As for this essay there are no existing portfolios to build upon, setting up an initial portfolio represents an interesting problem on its own. Due to the lack of a well-developed secondary market, portfolios need to be constructed making capital commitments to new funds over an initial build-up period. Portfolios are constructed over a timeframe of four years to ensure a minimal degree of vintage diversity, investing value-weighted in all funds of each year.

As descriptive statistics demonstrate, the average maximum investment degree of private equity buyout funds is only at 55%, i.e. well below the ideal of one. Therefore, an overcommitment strategy becomes inevitable. Optimal overcommitment weights are determined based on optimizing the investment degree while minimizing the liquidity shortfall. An initial overcommitment of 180 percent is applied, derived from the inverse of the average maximum investment degree of 55%.

Rebalancing to desired asset allocation weights is initiated after five years, when asset allocation levels are beginning to level off. Public equities and bonds are rebalanced quarterly, while the private equity allocation is rebalanced and recommitted on an annual basis. Following the initial portfolio buildup period, the recommitment approach is evaluated for the remainder of the sample period.

2.4 Results and Discussion

Figure 2.5 shows the investment degree resulting from applying the recommitment approach to portfolios initiated in 1983, 1985, 1987, 1989 and 1991. Portfolios have been built-up and have recommitted according to the aforementioned methodology.

After the initial build-up period, the investment degree for these portfolios settles in at roughly between 0.7 and 0.8, i.e. between 70% and 80% of total capital allocated to private equity would actually also be invested. Beginning in the middle of the 1990’s, the investment degree falls significantly towards the turn of the century, only to increase again substantially before settling in at around 0.7 and 0.8 again by the mid
Figure 2.5: Recommitment Approach for Portfolios initiated in 1983, 1985, 1987, 1989, and 1991

Notes: This figure applies the recommitment approach to Portfolios initiated in 1983, 1985, 1987, 1989, and 1991. Distributions and commitments that are assumed not to be called anymore are weighted by the inverse of the investment degree and are recommitted annually. The rebalancing amounts are also recommitted to new private equity funds ("vintages") annually. Further, 15% of the total private equity part of the portfolio is recommitted annually to ensure vintage year diversity and continuing access to the best GPs.
2000’s. From there on, the investment degree remains quite stable in that range.

The fluctuation in the investment degree is explained to a large degree by the characteristic "boom and bust cycles" of private equity. Figure 2.6 exemplifies the influence of these cycles on the investment degree.

Boom and bust cycles in private equity occur since the beginnings of private equity as we would know it today. The early days of private equity - from 1946 through 1981 - showed relatively small volumes of investment. Further, the industry was still unknown and unfamiliar to a broad range of investors. The first real "boom and bust cycle" - from 1982 through 1990 - was supported by a massive increase in leveraged buyout activity supported by the issuance of junk bonds (Michael Milken, Drexel Burnham). The boom culminated in the buyout of RJR Nabisco by Kohlberg Kravis Roberts & Co. in the late 1980s before facing the savings and loan crisis and recession.

The second cycle - from 1990 through 2000 - emerged from the savings and loan crisis, insider trading scandals, real estate market collapse and the recession of the early 1990s. Over that time, private equity firms became more institutionalized than ever before. Private equity activity boomed in the U.S. and a lot of investments could be exited quickly especially in the field of information technology, generating massive distributions for investors in the funds at that time. As a consequence, the investment degree would fall despite huge recommitments, as a lot of capital is returned to investors. This is due to the time lag between commitments and actual investments as exemplified in descriptive statistics in Figure 2.3 and Figure 2.4. During that boom time, additionally, a significant amount of overcommitment is applied as the investment degree falls and the recommitment approach weights already large distributions by the inverse of the (low) current investment degree (meaning further overcommitment). The burst of the dot-com bubble ended the unprecedented boom in the asset class at the turn of the millennium.

The third boom and bust cycle - from the early 2000’s through 2008
Figure 2.6: Influence of Private Equity Boom and Bust Cycles on the Investment Degree

Notes: During the typical "boom and bust cycles" however, investment degrees can change significantly. In boom times, investments could be exited quickly and at high prices, generating high distributions for investors to reinvest. Due to the time lag between commitments and actual investments, the investment degree falls. As the boom turns into bust, distributions decrease, while the funds continue to draw down capital. As a consequence, the investment degree increases again. The investment degree has become much less volatile since the middle of the 2000’s. One explanation might be that with the introduction of fair value accounting standards, as shown by Oberli [2012], a more continuous recommitment behavior can be observed as with the introduction of fair value accounting, funds value their portfolio companies at fair value rather than cost. Therefore, less rebalancing between asset classes occurs.
- sets in after the collapse of the dot-com bubble. Immediately after the collapse, distributions of private equity funds decreased abruptly, while the funds continued to draw down capital. As a consequence, the investment degree increased again from the low levels before the crisis. As at this point, all new (and huge) commitments that were given during the boom times were nonetheless - although at a slower rate - continually drawn down. The investment degree increased significantly again as a consequence. Only in the mid 2000’s, with a renewed boom in private equity activity, the investment degree started to decrease again. Leveraged buyouts during that time reached unparalleled size (compare Table 2.2, with a record of over 114 Bio. USD committed in 2006 to 32 newly raised buyout funds) and the unseen institutionalization of private equity firms, exemplified by the Blackstone Group’s 2007 initial public offering (”IPO”). The bankruptcy of Lehman Brothers on 15 September 2008 set an end to the boom cycle and led to the worldwide financial crisis.

The investment degree has become much less volatile since the middle of the 2000’s. A contributing factor, aside the typical boom and bust cycles, might be the introduction of fair value accounting standards, as shown by Oberli [2012]. With the introduction of fair value accounting, funds value their portfolio companies at fair value rather than at cost. Private equity therefore becomes more aligned with publicly traded assets, reducing the rebalancing activity between those asset classes. The allocation to private equity does not have to be reduced to the same degree as before the fair value approach, when public equity would fall during crises with private equity still being valued at cost, triggering a large degree of rebalancing.

Figure 2.7 shows what happens if various degrees of additional overcommitment are applied. As the investment degree increases with additional overcommitment ranging from 10% to 50%, chances of ending up at an investment degree above 1 increase, i.e. cash would not be sufficient to service all capital calls. In a portfolio context, however, the peaks can be absorbed with more liquid asset classes such as the fraction

30
of the portfolio that is invested in bonds. Temporarily using that liq-
uidity to cover capital calls could help increase the investment degree of
the private equity allocation significantly. As Figure 2.7 exemplifies, an
approach with additional overcommitment of 50% could lead to an invest-
ment degree of around 0.9 from the mid 2000’s until now and increases
the overall investment degree for a portfolio initiated in 1983 from 0.73
to 0.89. While introducing additional overcommitment might make sense
for an institutional investor with a portfolio of other liquid asset classes
that could temporarily cover private equity capital calls, that decision
has to be taken with regard to the needs and circumstances of investors
on an individual basis.

Evaluating the recommitment approach from an asset allocation per-
spective, Figure 2.8 and Figure 2.9 demonstrate the success of this
approach. After an initial build-up period of the portfolios, asset allo-
cation levels set in around year eight. Desired asset allocation levels are
retained thereafter and deviations from the allocation targets are cor-
rected quickly.
Figure 2.7: Recommitment Approach with Additional Overcommitment for Portfolios initiated in 1983, 1985, 1987, 1989, and 1991

Notes: Introducing additional overcommitment to the recommitment approach increases the investment degree at the risk of not being able to come up for the capital calls with the allocation to the asset class. An additional overcommitment of 50% leads to an investment degree of around 0.9 from the mid 2000’s onwards and increases the overall investment degree for a portfolio initiated in 1983 from 0.73 to 0.89. While such overcommitment behavior might make sense for an institutional investor with a portfolio of other liquid asset classes that could temporarily cover the private equity capital calls, that decision has to be taken with regard to the needs and circumstances of investors on an individual basis.
Notes: After an initial build-up period of the portfolios, desired asset allocation levels set in around year eight.
Notes: After the initial build-up period of the portfolios, allocation levels are maintained thereafter and deviations from the allocation targets are corrected quickly.

The recommitment approach has also been tested for venture capital. In line with Zwart et al. [2012], the approach remains successful although venture capital shows some differences with regard to cast flows especially in the second "boom and bust cycle" where venture capital experienced a massive boom during the dot-com era. As Figure 2.10 demonstrates, the investment degree in line with the reasoning for buyout funds decreased even more. In line, also the increase in the investment degree in the aftermath of the burst of the bubble took was delayed compared to private equity buyout investments.

To sum up, the approach taken towards recommitting offers a good and simple guidance on how to recommit to the asset class to optimize the investment degree. Figure 2.11 exemplifies the differences of the strategy compared to investing only unweighted dividends, and to not recommitting any capital at all. If only dividends are reinvested, the
Figure 2.10: Recommitment Approach for Buyout vs. Venture Capital

Notes: This figure shows that the approach works also for venture capital. Some differences exist with regard to cash flows especially in the second "boom and bust cycle", where venture capital experienced a massive boom during the dot-com era. The investment degree in line with the reasoning for buyout funds decreased even more. In line, also the increase in the investment degree in the aftermath of the burst of the bubble took was delayed compared to private equity buyout investments.
investment degree still shows the cyclical behavior. However, the investment degree settles in at significantly lower levels ranging from 0.35 towards 0.57. With no recommitments at all, the investment degree would just decrease continually after the initial portfolio build-up period as drawdowns decrease and as distributions increase.

2.5 Conclusion

In this essay, I develop a dynamic recommitment strategy for a private equity allocation in a portfolio context. The approach serves institutional investors with a private equity allocation to manage capital recommitments to private equity funds and achieve their desired allocation to the asset class.

Suggested recommitments are composed of 1) distributions and 2) commitments that are not expected to be called any longer, both weighted by the inverse of the actual investment degree, and 3) the amount necessary to rebalance the asset classes to the strategic policy portfolio. A minimal annual recommitment of 15% of the total private equity part of the portfolio ensures vintage year diversity and continuing access to the best GPs.

Historical simulations show that investment degrees in the range of 0.7 to 0.8 are attained, i.e. between 70% and 80% of total capital allocated to private equity would actually also be invested. During typical "boom and bust cycles", investment degrees can change significantly. In boom times, investments are exited quickly and at attractive prices, generating high distributions for investors to recommit. Due to the time lag between commitments and actual investments, the investment degree falls. As boom turns into bust, distributions decrease, while the funds continue drawing down capital. As a consequence, the investment degree increases again.

Introducing additional overcommitment increases the investment degree at the risk of not being able to come up for capital calls. An additional overcommitment of 50% leads to an investment degree of around
**Figure 2.11:** Comparison of the Recommitment Approach with Recommitting Dividends Unweighted and no Recommitments

*Notes:* This figure exemplifies the differences of the strategy compared to investing only dividends and compared to not recommitting any capital at all. If only dividends reinvested, the investment degree still show the cyclical behavior. However, the investment degree settles in at significantly lower levels ranging from 0.35 towards 0.57. With no recommitments, the investment degree would just decrease continually after the initial portfolio build-up period as drawdowns decrease and as distributions increase.
0.9 from the mid 2000’s onwards and increases the overall investment degree for a portfolio initiated in 1983 from 0.73 to 0.89. While such overcommitment behavior might make sense for an institutional investor with a portfolio of other liquid asset classes that could temporarily cover the private equity capital calls, that decision has to be taken with regard to the needs and circumstances of investors on an individual basis.

As the results clarify, the recommitment approach in this essay is able to optimize the investment degree for institutional investors in the asset class. However, the typical "boom and bust cycles" distract a more balanced investment degree. Further research is therefore encouraged in the field of anti-cyclical commitment behavior that anticipates oversized "cyclical" recommitments and could provide investors with a more equalised investment degree.

Limitations of the approach can be seen in the assumptions: A very important issue is related to the ability to invest in the best performing funds [Artus et al., 2004]. The spread observed between good and bad performers is significantly higher in the private equity asset class than the one observed for quoted stocks or bonds. In other words, aggregate figures might not give a true picture of the dispersion of performances, offering another direction of promising research.

Finally, this essay applies fixed asset allocation weights. By doing so, as demonstrated in the rebalancing methodology, investors purchase assets that are relative losers and sell relative winners. This rebalancing approach therefore basically leads to investing "against the market". An alternative approach could compare asset allocations with current market proportions in order to insure that differences are commensurate with differences between their circumstances and those of the average investor [Sharpe, 2009].
Acknowledgements

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All errors and opinions are my own.
References


Will Roger Federer once more win Wimbledon? Whether he won the tournament last year might not give you the best indication about his chances to win it again. Rather, you would look at his current physical and mental form and compare that with the other players on the tour. The same goes for the decision to invest in a private equity fund.

3 Second Essay:
Return Persistence -
Finding Top Quartile Managers

Abstract

Recent empirical research shows mixed evidence of return persistence. Still, the conventional rationale that many private equity investors employ during fund manager selection focuses on prior fund returns as a means of predicting future top quartile performance. Finding a fund manager based on past top quartile performance is not straightforward. First, there is leeway for managers to define top quartile performance, why actually much more than a quarter of funds claim to be top quartile. Second, private equity groups often raise subsequent funds before the previous funds’ performance can be accurately measured and classified as top quartile. In this light, a holistic due diligence process might provide a more accurate indication on the success and failure of managers and direct investors to invest in the future top quartile managers.

Keywords: Private Equity; Recommitment; Asset Allocation
JEL Classification: C53, G11, G23, G24
3.1 Introduction

While past performance is of course never a guarantee of future returns, first academic studies [Kaplan & Schoar, 2005] focusing on private equity returns and on the relationship between predecessor and successor private equity fund returns and performance showed a surprisingly strong correlation. That relationship was not expected as for mutual funds, no top quartile return persistence could be detected [Carhart, 1997; Berk & Tonks, 2007]. However for private equity funds, Kaplan & Schoar [2005] showed that the best fund managers of predecessor funds often appeared in the top quartile again with their successor funds for both buyout funds and venture capital.

Performance differences between top quartile and bottom-quartile funds are considerable for private equity funds. Over the time period from 1984 towards 2004, the spread between top quartile and bottom-quartile funds was close to 2000 basis points with regard to IRR according to data obtained from Prequin, a database for alternative assets. Fund manager selection can therefore result in returns ranging from exceeding the long-term stock market yield (top quartile funds) to being unable to even return capital (bottom quartile funds). Whether an investor beats the long-term stock market yield depends therefore to a large degree on fund selection and access to the top-performing GPs. More recent empirical research questions the previous findings of top quartile return persistence. Harris et al. [2013] show that persistence of buyout fund performance has fallen considerably. For venture capital, persistence remains.

In practice, many private equity investors still pay a lot of attention to the "top quartile label" proudly exhibited by a continuously growing number of fund managers. But does top quartile manager selection really come down to identify past winners and to recommit to these funds? Is past top-quarter performance indeed an indication of future outperformance? This essay evaluates the empirical evidence on return persistence for private equity funds with the intention to find a future top quartile manager and looks at the implementation of such an approach.
The rest of the paper is divided into four sections. The first section is devoted to the definition of various return and performance measures, while the following section sheds light on empirical evidence on persistence of these measures and discusses potential reasons for the phenomenon. The next section shows constraints in the implementation of a top quartile approach in investing in fund managers and suggests a holistic due diligence process. The final section summarizes and draws a conclusion on finding a top quartile manager.

3.2 Private Equity Return Measures

First and foremost, when evaluating the return persistence of a private equity fund and classifying the partnership into quartiles, we must come to an agreement on an adequate measure of return. Evaluating the returns of private equity funds needs to take into consideration the specific structural characteristics of the asset class.

3.2.1 Characteristics of the Asset Class

Investors - called Limited Partners (LPs) - commit a certain amount of capital to private equity funds at fund inception. Private equity fund managers - called General Partners (GPs) - search for portfolio companies they decide to invest in and call money when needed up to the amount committed by LPs [Phalippou & Gottschalg, 2009]. When a divestment occurs, the GP distributes the proceeds to its LPs (minus fees). The timing of these cash flows is by its nature unknown ex ante. A fund typically has a life of ten years, however can be extended by typically two years or more if both GPs and LPs agree. Stakes in private equity funds are basically non-tradable, although in the aftermath of the financial crisis, a remarkable amount of secondary transactions was observable.

To inform investors on the value of their investments, GPs self-report a quarterly Net Asset Value (NAV) that reflects the value of on-going investments, i.e. the investment portfolio companies. As portfolio companies are not traded publicly, it remains difficult to measure NAVs objec-
tively and valuations can be affected to some degree by strategic valuation decisions of the fund managers. Often, portfolio companies remain valued at cost for the first years following acquisition and later are valued using public market comparisons in the form of multiples. For objective return measures, a favored approach would be one where return figures can be derived without relying on NAVs disclosed by the GPs of private equity funds. Several studies have used methodologies to circumvent these problems by inferring the private equity buyout fund return only on the basis of its cash flow history.

Methodologies that dominate practice with regard to return measures include the computation of cash-on-cash multiples and the internal rate of return (IRR). Given the limitations of cash-on-cash returns and IRR calculations, an approach that compares the result of private equity investments to that of publicly traded companies has recently evolved from academia [Nickels, 1996] and is called the Public Market Equivalent (PME).

### 3.2.2 Cash-on-Cash Multiples

The most straightforward return measure can be seen in cash-on-cash multiples, the ratio of the money returned and/or currently in the fund in relation to the money invested. One common variant - the ratio of distributed to paid-in capital (DPI) - looks at the ratio of the capital returned to LPs to the funds that they have provided in the first place. A second, frequently used approach is the ratio of the capital returned to the LPs and the current value of the fund’s holdings (NAVs) to the funds initially provided, the so called total value to paid-in capital (TVPI) [Lerner et al., 2012]. Based on these measures, funds can be compared to other funds with the same vintage.

The advantage of multiples is their relatively easy application and their intuitive understandability. The main disadvantage is the potential for misleading results. Multiples are not annualized in any form as it is common practice with most other return measures. Furthermore, they do
not take into account the time value of money as cash-on-cash multiples are based solely on absolute numbers. Consequently, the standalone use of multiples for performance evaluation of private equity funds can be misleading.

3.2.3 IRR

The investment process for buyout funds differs substantially from those associated with other asset classes such as e.g. closed-end funds. The capital committed to the fund is invested over several years and the funds’ subsequent distributions are irregular in terms of both size and frequency. Unlike open-end investment vehicles, private equity funds are typically closed-end funds where the GP fully controls a fixed pool of capital along with the associated investment process. Thus, the timing of investments and divestments is a major component of the value generation of GPs and needs to be taken into account with regard to returns.

Since cash-on-cash returns do not reflect that cash-flow timing, it is regarded as an inappropriate standalone return attribution methodology for evaluating GP performance. Therefore, a value-weighted return measure, which takes into account the timing of investments and divestments by the fund manager is needed. Although also associated with shortcomings and restrictions, the IRR has emerged as industry standard.

The IRR as a value-weighted return measure is computed with the cash inflows and cash outflows of a fund and corresponds to an overall rate of return to all investors, taking into account the various entry and exit points. Mathematically, the IRR is the interest rate that equals the net present value of all cash flows to zero.

\[ \sum_{t=0}^{T} CF_t(1 + IRR)^{-t} = 0 \]  

(13)

Here, \( T \) is the lifetime of the fund and \( CF_t \) is the cash flow accrued over period \( t \). There are several shortcomings and restrictions regarding the calculation of the IRR however. Unrealized cash flows (NAVs) have
to be estimated and are included in the calculation of the IRR. As an accounting quantity both determined and reported by the GPs, NAVs suffer from a valuation bias. NAV calculation is not applicable during the first few years of a fund, as estimates regarding future cash flows are highly insecure and due to the J-curve effect. IRR values are therefore influenced in a non-appropriate, negative way during the first years why for return measurement more reliable results are achieved when mature funds are analyzed. The introduction of fair value accounting standards has lead to some relief as NAV valuations have become more aligned with publicly traded companies [Oberli, 2012].

**Figure 3.1** shows the top-to-bottom quartile private equity IRR ranges by vintage year from 1984 towards 2004. Over that time period, the gap between top quartile and bottom-quartile funds had an average spread of close to 2000 basis points [Boyd, 2012]. GP selection can result in returns ranging from exceeding the long-term stock market yield (top quartile) to being unable to return capital (bottom quartile). Being able to identify the top quartile private equity managers therefore substantially enhances an investor’s returns.

### 3.2.4 Public Market Equivalent (PME)

The PME concept was developed in the industry in the mid 1990s [Nickels, 1996] and is still widely referenced today [Sorensen & Jagannathan, 2013]. PMEs offer a simple solution to the benchmarking problem related to time-weighted returns. Nickels [1996] proposed to assess the opportunity cost of capital for buyouts by creating a mimicking portfolio of public market equivalents, i.e. the S&P 500 index for the U.S. These investments are designed to replicate the risk profile of buyouts in terms of timing and systematic risk. One has to be careful with the choice of a benchmark index though, as only total return indexes make sense for the analysis. Using for instance the S&P 500 as a benchmark while ignoring dividend payments might reduce PME measures by several points and significantly distort the result of the comparison.
The PME approach starts with the following simple question: Given that an investor invests - in terms of present value - USD 1 in a private equity fund, how many USD would the investor have to invest in a given public market index in order to generate a cash flow equivalent investment and, hence, in order to end up with the same terminal wealth [Kaserer & Diller, 2004]? The PME is the answer to this question. It is nothing else than the ratio of the terminal wealth obtained when investing in a private equity fund and reinvesting intermediate cash flows in a given public market benchmark compared to the terminal wealth obtained when investing the same amount of money in the benchmark [Kaserer & Diller, 2004]. In this way, a complete performance ranking of all available funds becomes possible. Mathematically, the PME is defined as follows:
Kaplan & Schoar [2005] in their seminal paper on private equity returns and persistence implement the PME calculation for performance calculation and illustrate the concept with an example: 'A fund with a PME greater than one outperformed the S&P 500 (net of all fees). For example, a private equity fund investing USD 50 million in March 1997 and realising USD 100 million in March 2000 would have generated an annualised IRR of 26%. However, a limited partner would have been better off investing in the S&P 500 because USD 50 million in the S&P 500 would have grown to USD 103.5 million over that period. The PME of 0.97 (or 100 / 103.5) for this investment reflects the fact that the private equity investment would have underperformed the S&P 500. Alternatively, a private equity fund investing USD 50 million in March 2000 and realising USD 50 million in March 2003 would have generated an IRR of 0%. However, a limited partner would have been better off investing in the private equity fund because USD 50 million invested in the S&P 500 would have declined to USD 29.5 million over that period. The PME of 1.69 (or 50 / 29.5) for this investment reflects the fact that the private equity investment would have outperformed the S&P 500.'

Despite predominately being based on cash flows, the PME concept still depends to some degree on NAVs when the fund remains not fully liquidated and the NAV is different from zero at the end of the time interval. In those cases, the benchmarking actually reduces to the comparison of the end balance of the index-tracking fund to the NAV of the private equity fund, placing more emphasis on the latter number and relying indirectly on the assumption that the private equity investor can immediately exit the fund at that value. This is why PME is generally used to benchmark the performance of mature funds, where the non-liquidated NAV represents a small fraction of the total distributions (see Rouvinez
The concept of PMEs shows a very important quality. It is simple and it circumvents the problems associated with IRR as a return measure. As the IRR is calculated using cash flows rather than actual realized returns, the IRR translates into returns only under extreme assumptions of constant and common discount rates and reinvestment rates. This is obviously not a realistic reinvestment assumption and makes the IRR as a return measure for an investor problematic. Specifically, as far as an investment in a private equity fund is concerned, the LP may be interested to know the terminal wealth of his investment relative to the terminal wealth of a risk equivalent public market investment. Evidently, the IRR cannot be used for answering this question. The PME approach offers a meaningful way of comparing and ranking funds in this respect.

The simple application at the same time however represents the source of most critique. The main shortcomings of the concept as applied in literature by Kaplan & Schoar [2005], Phalippou & Zollo [2005] and Kaserer & Diller [2004] has to be seen in the lack of representation of financial leverage and systematic risk. Due to the studies’ data source, lacking access to extensive deal-level data, they make use of a public market benchmark unadjusted for leverage and systematic risks. Extensive deal-level data however would be needed in order to adequately adjust returns for financial leverage and systematic risk, i.e. to assess adequate opportunity cost of capital for the individual buyout transactions.

3.3 Persistence in Private Equity Fund Returns

While past returns are of course never a guarantee for future returns, this section examines empirical evidence in academic research on the relationship between predecessor and successor private equity fund returns.

Many LPs still pay a lot of attention to the best performing funds in their decisions to invest in private equity funds. Funds are often classified according to the return quartile they are ranked in. Finding top quartile managers and getting access to their funds therefore becomes an
important criterion for investors. But does manager selection really come down to identify past winners and does it pay off to recommit to these funds? Is past performance an indication of future outperformance? A growing body of academic research based on contingency table test and cross-sectional regressions of future fund performance on current performance show mixed evidence on return and performance persistence. While studies that include fund returns before the year 2000 find significant statistical evidence of persistence, post 2000’s returns show mixed evidence [Harris et al., 2013].

3.3.1 What is Top Quartile?

A top quartile fund by definition belongs to the 25 percent best funds in its peer group. Top quartile funds are the 25% of funds with the highest returns for that vintage. Second quartile funds are represented by the next 25%, down to the bottom quartile consisting of the 25% of the vintage funds with the lowest returns. If there were no persistence in returns, we would expect to see that a successor fund had around a 25 percent chance of being in a given quartile, regardless of the predecessor fund’s quartile. Academic research measures performance mainly based on cash-on-cash multiples, IRRs or PME; all defined as in the preceding section.

3.3.2 Quartile Persistence: Literature Review

3.3.2.1 Initial Empirical Evidence on Return Persistence In a seminal paper on private equity returns, persistence and capital flows Kaplan & Schoar [2005] look at 764 private equity funds between 1980 and 2001. They show that average fund returns (net of fees) approximately equal the S&P 500. Further, Kaplan & Schoar [2005] document that better past returns are associated with better future returns (and vice-versa). That relationship was not expected as for mutual funds no persistence could be detected for the better performing funds. Persistence there could be detected only for the worst performing funds (see Carhart
However for private equity funds, top quartile fund managers of predecessor funds appeared in the top quartile with their successor funds for both buyout funds and venture capital. Kaplan & Schoar [2005] explain persistence by heterogeneity in GP skills and limited scalability of human capital. It remains puzzling however that these return to superior skills are not appropriated by the scarce input, i.e. the GPs, in the form of higher fees. Several subsequent studies attempt to rationalize this phenomenon (see Glode & Green [2008]; Hochberg et al. [2010]; Marquez et al. [2010]).

Why do investors not adjust capital allocations to the point where persistence disappears? Why do funds not adjust fees to the point where persistence disappears? Kaplan & Schoar [2005] conjecture that this result comes from the fact that top funds voluntarily restrict their size. This argument can be related to the Berk & Tonks [2007] model of mutual funds. Investors learn about the skills of a manager. Following good performance, they want to allocate more to the point where expected performance of the top fund equals that of other funds. If funds limit their size, persistence arises.

Hochberg et al. [2010] argue that incumbent investors have soft information about fund manager abilities on which they could 'hold-up' the fund manager. The idea is that if the incumbent investors do not re-invest in the follow up fund, outside investors will think that the soft information is negative and, as a result, will reduce their allocation to the newly raised fund. The venture capital firm, therefore, needs to pay a rent to the incumbent investors and they do so by limiting their size, hence offering high expected returns. Glode & Green [2008] argue that it is not soft information about abilities that fund managers can be 'held-up' with but information about their investment strategy. The same reasoning as above follows. Fund managers need to pay a rent to incumbent investors thus creating persistence.

These findings on persistence by Kaplan & Schoar [2005] initiated further empirical research on the relationship between predecessor and
successor private equity fund performance. Table 3.1 gives an overview of the various studies and the main findings related to performance and persistence.

Conner [2005] empirically examined the return persistence for venture capital firms. Venture capital funds following a top quartile predecessor had a 44 percent probability of being top quartile themselves with greater than 99 percent confidence. Successor funds to top quartile predecessors further had a 71 percent probability of performing above the median fund from the same vintage year. Additionally, funds following bottom-quartile-ranked predecessor funds had a 48 percent probability of being in the bottom quartile (also supporting persistence with greater than 99 percent statistical confidence) and a 68 percent probability of being below the median. These results suggest strong persistence in both good and poor performance in venture capital funds.

Rouvinez [2006] shows significant top quartile persistence coupled with strong survivor bias. Serial performers have no advantage over first-time achievers. Figure 3.2 shows the transition probabilities of the Rouvinez [2006] data set. The top line shows the probability of a fund ending up in each quartile, given that the fund is classified as top quartile. The second line represents the second quartile and so forth. Transition probabilities on the diagonal are higher than on the cross diagonal, which can be interpreted as an indication of persistence. The largest probability is that lower quartiles do not raise a successor fund; there is about a 40% probability that managers with lower quartile funds do not come back to market. The other cluster of high transition probabilities is in the upper left corner of the matrix, a sign of top quartile persistence.
<table>
<thead>
<tr>
<th>Authors</th>
<th>Dataset</th>
<th>Vintages</th>
<th>Methodology</th>
<th>Geographical Focus</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conner [2005]</td>
<td>TVE, VC</td>
<td>1980-1995</td>
<td>IRR, TVPI</td>
<td>USA</td>
<td>Significant top quartile persistence (around 44% top quartile persistence and 48% bottom-quartile persistence)</td>
</tr>
<tr>
<td>Rouvinez [2006]</td>
<td>TVE</td>
<td>before 2000</td>
<td>IRR</td>
<td>USA</td>
<td>Significant top quartile persistence (around 40% top quartile persistence) coupled with strong survivor bias</td>
</tr>
<tr>
<td>Paresys [2010]</td>
<td>Preqin</td>
<td>before 2000</td>
<td>IRR</td>
<td>World</td>
<td>Strong correlation between the performance of a fund and the success of its predecessor. 43% of GPs that manage a top quartile fund also have their next fund ranked in the top quartile, and a total of 68% beat the median benchmark.</td>
</tr>
</tbody>
</table>
**Figure 3.2:** Transition Matrix: Probability of Transition from one Quartile to Another

<table>
<thead>
<tr>
<th></th>
<th>→ Q1</th>
<th>→ Q2</th>
<th>→ Q3</th>
<th>→ Q4</th>
<th>→ Ø</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>33%</td>
<td>22%</td>
<td>15%</td>
<td>14%</td>
<td>16%</td>
</tr>
<tr>
<td>Q2</td>
<td>20%</td>
<td>21%</td>
<td>15%</td>
<td>16%</td>
<td>27%</td>
</tr>
<tr>
<td>Q3</td>
<td>12%</td>
<td>17%</td>
<td>17%</td>
<td>15%</td>
<td>39%</td>
</tr>
<tr>
<td>Q4</td>
<td>11%</td>
<td>9%</td>
<td>16%</td>
<td>22%</td>
<td>43%</td>
</tr>
</tbody>
</table>

*Notes:* Transition matrix: probability of transition from one quartile to another when considering two successive funds by the same manager. Most probable event for a top quartile is to achieve top quartile again. Most probable event for lower quartile funds (Q3, Q4) is that no successor fund was raised.

*Source:* Rouvinez [2006].

**Figure 3.3** represents the probability of achieving top quartile performance twice in a row. For that reason, transactions where no successor fund is realized are discarded as these do not represent an investment alternative. Probabilities of repeated top quartile performance are even higher. Rouvinez [2006] finds that probability stays close to 40 percent and does not increase with the experience of the manager. The first bar represents the transition probabilities for the second fund given that the first fund was classified top quartile. There is a 39% probability that the fifth fund of a manager who achieved top quartile return with his fourth fund is top quartile again. There is further about a two in three chance to achieve top half return at any point in time during the life of a manager. Both the probabilities for top quartile and top-half
returns are much higher than the theoretical 25 and 50 percent for a random process, pointing to some long-term persistence in returns.

**Figure 3.3:** Transition Probabilities from Top Quartile to all Quartiles

![Transition Probabilities Diagram](image)

*Notes:* Transition probabilities from top quartile to all quartiles as a function of the ranking in the sequence of funds by the same manager. There is a 39% probability that the 5th fund by a manager who achieved top quartile return with his 4th fund is top quartile again.

*Source:* Rouvinez [2006].

Are the probabilities higher for managers with a track record of top quartile funds only? Given all predecessor funds are ranked top quartile, **Figure 3.4** shows the probability increases for the third fund to 51 percent but reverts back to 40 percent for the fifth fund, showing no clear advantage either.
**Figure 3.4:** Transition Probabilities from Top Quartile to all Quartiles: All Predecessor Funds Top Quartile

Notes: Transition probabilities from top quartile to all quartiles as a function of the ranking in the sequence of funds by the same manager, given that all predecessor funds are top quartile. There is a 40 percent probability that the 5th fund by a manager who achieved a top quartile return with all previous 4 funds is top quartile again.

*Source: Rouvinez (2006).*


Paresys [2010] uses a dataset of Preqin and also finds a strong correlation between the performance of a fund and the success of its predecessor. 39% of managers with a top quartile fund have their follow on funds also ranked in the top quartile, and nearly 70% of these managers beat the median benchmark with their next fund. Persistence is also detected for the worst performing managers. 38% of fund managers with bottom quartile ranked funds saw their next fund ranked in the same quartile, while just 15% of managers with bottom quartile funds were able to subsequently
produce top ranking funds.

3.3.2.2 Return Persistence post 2000’s More recent academic research that includes private equity fund performance data post the year 2000 shows mixed evidence on persistence.

Chung [2012] uses a dataset of private equity funds raised before 2005 and finds that performance persistence in the private equity industry is not long-lived. Current fund performance is positively and significantly associated with the performance of the first follow-on fund, but the magnitude of persistence declines substantially afterwards. Persistence, if any, is largely driven by relatively underperforming funds, i.e. funds in the bottom or medium performance tercile portfolios. A one percentage point increase in the IRR for a buyout fund in the medium tercile portfolio leads to a 95 basis point increase in the IRR of its follow-on fund, whereas the number is 56 basis points for a fund in the upper tercile portfolio. In a regression based on multiples, the difference is similar; a one percentage increase in multiple for a fund in the medium tercile portfolio is associated with a 69 basis point increase in the following fund’s multiple, while it is only 11 basis points for funds in the upper tercile portfolio.

Chung [2012] explains the short-lived performance persistence with the commonality of market conditions between two successive funds. As a private equity fund’s life is about ten years, and a follow-on fund is usually raised three to five years after a proceeding fund’s raising, successive funds have an overlapping investment period of several years, during which common economic conditions or shocks can simultaneously influence the performance of preceding and following funds. Therefore, the similarity of market conditions between the current and follow-on funds can affect persistence. The extent to which common market conditions explain the short-run persistence will counter the view that private equity partnerships have proprietary skills.

Furthermore, Chung [2012] shows that better performing funds raise
larger follow-on funds than their worse performing counterparts, but funds which grow more subsequently underperform. The return-chasing-capital phenomenon is more pronounced for buyout funds, and the diminishing returns to capital inflows are found only among venture capital funds. The asymmetry between buyout and venture capital funds in terms of the effect of capital flows on performance persistence is consistent with the view that the venture capital industry is labour-intensive, while the buyout industry is capital-intensive. In other words, in managing portfolio companies of a venture capital fund, fund managers provide not only capital but also various kinds of resources such as industry networks and management skills. An increase in fund size, which will increase either the target size or the number of investments, will require a greater amount of management care.

Harris et al. [2013] uses a new dataset from Burgiss, sourced from over 200 institutional investors to confirm the previous findings that there was significant persistence in performance, using various measures, for pre-2000 funds - particularly for VC funds. Post-2000, persistence of buyout fund performance falls considerably and is associated with poorly performing funds, which have tended to repeat their poor performance relative to other funds. When funds are sorted by the quartile of performance of their previous funds, performance of the current fund is statistically indistinguishable regardless of quartile. At the same time, however, the returns to buyout funds in all previous performance quartiles, including the bottom, have exceeded those of public markets as measured by the S&P 500.

3.3.2.3 Why Persistence Persists - or Does Not  [Kaplan & Schoar, 2005] see heterogeneity in GP skill and limited scalability of human capital as hypotheses for the persistence of private equity funds’ persistence. Indeed one explanation might be that good performance puts talented GPs in touch with talented entrepreneurs, who create good outcomes. A virtuous cycle sets in where success begets success. A
successful GP could choose from among more deals, likely from better entrepreneurs. Top-tier funds can leverage their perceived expertise into investing on more favourable terms, generating better returns for LPs.

Lerner et al. [2007] look at LPs and show that returns that institutional investors realise from private equity differ dramatically across institutions. Endowments’ annual returns are nearly 21% greater than average. Analysis of reinvestment decisions suggests that endowments (and to a lesser extent, public pensions) are better than other investors at predicting whether follow-on funds will have high returns. The results are not primarily due to endowments’ greater access to established funds, since they also hold for young or undersubscribed funds. These results suggest that investors vary in their sophistication and potentially their investment objectives. Caveats include that the study was before the recent financial and economic crisis that hit endowments particularly hard. Further, endowment’s superior selection skills may be driven to a large degree by venture capital funds.

More recent academic research that includes private equity fund performance data post the year 2000 shows mixed evidence on persistence. When it comes to the dynamic of top quartile funds attracting more investors and growing disproportionately, Lopez-de Silanes et al. [2013] discover diseconomies of scale in managing private equity funds. Performance does not appear to be scalable, a potential explanation for mixed evidence on persistence of buyout funds [Chung, 2012; Harris et al., 2013]. Investments held by private equity firms in periods with a high number of simultaneous investments underperform substantially. Harris et al. [2013] see one reason in the difficulty that firms have holding on to talent. Once they reach a certain point in their career, rainmakers often leave to set up a fund on their own. These spin-out groups then go on to compete with their progenitors for deals, which can result in a less more efficient, more mature market for deals and higher prices. Partners at successful firms might also become less eager to take the risks to get an outstanding return, i.e. they become more risk-averse, which can lead to more modest
returns. Further, a refinement of areas of expertise and personnel additions/changes coupled with changing market dynamics can significantly alter the strategy pursued by the GP and the environment in which the funds will invest.

Another reason can be seen in changes in the buyout business model, with operating engineering becoming increasingly important. Alternatively, it is possible that general partners learned from each other and that has led to the reduction in persistence [Harris et al., 2013].

Interestingly, Harris et al. [2013] and Chung [2012] showed that continuing persistence of VC returns and performance, supporting the industry rule of thumb to invest with GPs that have previously performed well and to avoid those that have not. The stronger performance persistence for VC as compared to buyout suggests that GP skills and networks for successful VC investing are harder to replicate than is true in buyout.

### 3.4 Finding a Top Quartile Manager

The conventional rationale that many private equity investors still employ during GP selection is a focus on prior fund returns as a means of predicting future top quartile performance. Finding a top quartile manager however is not straightforward as the definition of quartiles is sometimes vague and it is difficult to decide on a predecessor fund’s performance when the decision whether to reinvest in the follower fund fundraising has to be taken.

#### 3.4.1 Limitations in Implementing a Top Quartile Approach

##### 3.4.1.1 Top Quartile Classification

A top quartile fund by definition belongs to the 25 percent best funds in its peer group. Many more funds in the market claim top quartile performance though. One reason is that except for the 25 percent ratio itself, nothing else in this definition is cast in stone. Whether 'best performance' refers to cash-on-cash multiples, IRRs, PME or another performance measure is not defined,
neither is the question of who are the ‘peers’ and what the geographic region is. Therefore, caution should prevail when GPs claim top quartile performance as their interest in claiming top-quarter performance is high and the potential for manipulation is wide.

Wang & Conner [2004] show that based on the primary measures to determine top quartile performance, the net IRR and multiple of cost, only 84 percent of funds could claim top quartile on both metrics. Consequently, more than 25% of all funds claimed to be top quartile: those being top quartile on on both measures, but also the ones based on IRR or multiple only.

Furthermore, a fund moves between quartiles over the course of its life. A fund claiming top quartile may be referring to a point in time rather than to a persistent rating [Boyd, 2012]. The universe used for analysis showed that 64 percent of funds achieved top quartile performance at some point during their lives.

Hendershott [2008] looks at the likelihood that GPs with top quartile track records also have the corresponding top quartile ability. Using a Baynesian approach, the ability to outperform is inferred from performance persistence. Varying manager ability thereby increases return persistence over time, while luck diminishes performance persistence. The level of performance persistence in any given asset class reveals the role that managerial ability plays in determining investment returns. Looking specifically at private equity funds, Hendershott [2008] fits the model to the observed roughly 40% probability that a top quartile private equity fund will be followed by another top quartile fund and finds that 80% confidence in a manager being in the top ability quartile requires observing top quartile performance in three or four prior funds. Investing with these managers - those with a series of top performing past funds - is then likely to produce superior returns.

3.4.1.2 Ex-ante Performance Evaluation The combination of performance persistence and a consistently large spread between better
and worse performing funds [Artus et al., 2004] leads many private equity limited partners to focus on investing in the subsequent funds of past top quartile performers [Hendershott, 2008]. There are, however, challenges inherent to implementing this strategy. Substantial time is necessary, typically years, before the results of private equity investments become known. In the interim, funds generally carry their portfolio at cost unless there is a subsequent financing event. Thus, private equity managers often raise their next fund before the performance of the previous fund can be accurately measured.

Phalippou [2009] reveals that a private equity firm raises a follow-on fund after a median of 3 years, 15% of the funds raise a succeeding fund after only 1 year and 22% after 2 years. This means that for investors to act on this correlation, they would need to know what the final performance of a fund is after only a few years of operation. This seems difficult.

Freidman [2011] shows that 50 percent of top quartile performing buyout funds observed in their fourth year of investment life will finish in the top quartile. For venture capital, the value is even higher with 60 percent ending in the top quartile. Using Bayes Theorem and coupling these statistics with an observation of 43 percent of top quartile funds repeating their performance in their successor fund provides that 31 percent of top quartile buyout funds (33 percent for venture capital) observed during their fourth year of investment life are likely to replicate top quartile performance in their successor fund. These results demonstrate the limitation of manager assessment based solely on prior performance, given that the ex-ante probability of selecting a top quartile manager at random is 25 percent.

In cases where the fundraising period for the successor fund occurs two or three years after the top quartile performing funds final close, the probability of maintaining top quartile performance is reduced. The decision to reinvest based on performance would therefore need to be based on funds of an even earlier generation that are more mature. However,
Chung [2012] finds that the second or prior funds’ performance can be a misleading indicator of future performance.

Given that top quartile performance is not reliably visible before investors have to make their next commitment, Rouviniez [2006] concludes that due diligence including proper understanding of the drivers of past returns is far more important than the quartile itself. Understanding how and why a manager achieved superior performance and whether the conditions for success are likely to be met again in the future is crucial for the investment decision which is why a thorough due diligence takes a central role.

3.4.2 Finding a Top Quartile Manager - Due Diligence

A successful due diligence review includes a focus on trying to understand the factors that influence the success and failure of portfolio companies [Boyd, 2012]. The best approach is to talk to GPs, co-investors and the CEOs of the portfolio companies themselves. In addition, sensitivity analysis is a critical tool for providing insight as to whether performance is skewed up or down based on particular investments. The analysis enables an investor to understand how dependent the portfolio’s performance is on one exceptional success or failure. Due diligence surveys of the investment strategy and philosophy of the team add further depth, beyond what is found in the private placement memorandum (PPM) and other marketing materials. Direct meetings with GPs and back-office personnel show areas of expertise, as well as limitations within the team and the overall dynamic within the firm. Lastly, reference checks should be made to current and past limited partners, prior members of the firm, CEOs of portfolio companies, lenders, consultants, etc., providing further verification of the firm’s ability or outlining additional areas of concern.

This type of in-depth screening process - focused heavily on due diligence rather than (past) performance-only - will be far more apt to capture both the skill of a particular strategy and potential red flags for investors.
That approach has implications on the inclusion of new and emerging managers within a private equity portfolio. The most common rationale provided by investors for not committing to these groups is their lack of historical track record. Given the prior discussion of past performance as a limited indicator of future success, new and emerging managers should not be excluded solely on this basis. Through careful and thorough due diligence, the selection of high-quality new and emerging managers may prove effective in achieving top-quarter performance, while providing further portfolio diversification. Further, backing successful new managers at an early stage results in access to later, oversubscribed fund generations [Boyd, 2012].

In sum, a holistic due diligence process is required in order to successfully evaluate private equity investments. LPs that ignore this method and rely solely on investment performance for selecting their GPs are prone to miss the new top quartile managers.

3.5 Summary and Conclusion

Empirical evidence on private equity return persistence shows mixed results. While the first academic studies [Kaplan & Schoar, 2005; Conner, 2005; Rouvinez, 2006; Phalippou, 2009; Paresys, 2010] show statistically significant return persistence for both venture capital and buyout funds, later studies [Harris et al., 2013] show mixed evidence on return persistence for buyout funds after the year 2000.

As funds with strong performance tend to attract investors and grow in size, performance does not appear to be scalable, a sign of diseconomies of scale in managing private equity funds. Reasons can be seen in in the difficulty that firms have holding on to talent. Once they reach a certain point in their career, successful GPs often leave to set up a business on their own. These spin-out groups then go on to compete with their progenitors for deals, which can result in a less more efficient, more mature market for deals and higher prices. Partners at highly successful firms might also become less eager to take the risks to get an outstanding re-
turn. A refinement of areas of expertise and personnel additions/changes coupled with changing market dynamics can further alter the strategy pursued by the GP and the environment in which the funds will invest.

Even if persistence is still there to a certain degree, especially for venture capital funds, implementing a strategy to invest in fund managers with an extended track record of superior returns is not easily implemented. First, due to ambiguous performance criteria, there is some leeway to define top quartile performance why much more than a quarter of funds claim to be classified as top quartile. Further, a fund moves between quartiles over the course of its life. A fund claiming top quartile may be referring to a point in time rather than to a persistent rating.

Second, private equity groups often raise subsequent funds before the previous funds’ performance can be accurately measured. This means that for investors to act on top quartile correlation between predecessor and following funds, they would need to know what the final performance of a fund is after only a few years of operation, i.e. typically when the fund is still the investment phase. Today, for example, we may observe that good vintage-1995 funds tended to be followed by good vintage-1997 funds. But exploiting this for investment purposes required knowing in 1997 which of the vintage-1995 funds were good. Interim performance is a noisy signal of eventual performance, which is itself a noisy signal of future performance. This compounds the challenge of identifying top private equity managers [Hendershott, 2008].

Even as empirical evidence shows that past performance can help to some degree identify top quartile managers, it still can’t identify what makes the top-ranking managers outperform. The best approach is to talk to GPs, co-investors and the CEOs of the portfolio companies themselves. Due diligence surveys of the investment strategy and philosophy of the team add further depth, beyond what is found in the private placement memorandum (PPM) and other marketing materials. Direct meetings with other GPs and back-office personnel show areas of expertise, as well as limitations within the team and the overall dynamic within
the firm. Lastly, reference checks should be made to current and past limited partners, prior members of the firm, CEOs of portfolio companies, lenders, consultants, etc., providing further verification of the firm’s ability or outlining additional areas of concern.

In the end, a holistic due diligence process might offer the best insights on the factors that in the end determine success and failure of managers and give investors in the asset class the best indication to find a top quartile manager.
Acknowledgements

I am grateful for the inspiring discussions with and suggestions of Matthew Rhodes-Kropf, Associate Professor at the Entrepreneurial Management Unit at Harvard Business School ("HBS") and Josh Lerner, Chair of the Entrepreneurial Management Unit and Jacob H. Schiff Professor of Investment Banking at HBS. All errors and opinions are my own.
References


"Even when I go for a haircut, my barber is talking about investing in private equity"

Chang Sun, Warburg Pincus Asia LLC

4 Third Essay:
Private Equity in Emerging Markets:
Structural Drivers for Fundraising in Asia

Abstract
Institutional investors increasingly try to diversify their private equity investments geographically. As investors are obviously interested in emerging markets, the essay examines the determinants of private equity market activity and shows investors the differences of drivers in Asia as the largest emerging market for private equity compared to developed markets. Exit opportunities and the amount of credit provided by the banking sector show to be strong drivers. Unlike in developed markets, emerging markets are negatively impacted by the amount of credit provided by the banking sector. Differentiating along investment stages, economic growth and research and development (R&D) expenditures are found to be of particular importance to venture capital (VC). For later stage leveraged buyouts (LBOs), the degree of recent deals negatively impacts funds raised.

JEL Classification: C33, G23, G24, G32
Keywords: Private Equity; Venture Capital; Emerging Markets
4.1 Introduction

Investments in private equity have grown tremendously over the last decade\(^9\). At the end of 2011, $3 trillion in assets under management (AuM) were held across the entire industry for the first time, according to Preqin \([2012]\). The merits and the potential of the asset class seem undisputed: Besides the obvious attractiveness for investors with regard to past investment returns, private equity has also been instrumental in bringing innovations to market at a rapid pace \([\text{Kortum} \& \text{Lerner}, 2000; \text{Hellman} \& \text{Puri}, 2000]\), creating economic growth, jobs \([\text{Fehn} \& \text{Fuchs}, 2003; \text{Belke et al.}, 2003]\) and opportunities for further technological innovation \([\text{Jeng} \& \text{Wells}, 2000]\). There seems to be a broad consensus that a strong private equity market is a cornerstone for commercialisation and innovation in modern economies \([\text{Groh}, 2009]\). Governments, attracted by the technological innovation and job growth that private equity has spurred, have therefore sought to advance the asset class accordingly \([\text{Gompers} \& \text{Lerner}, 1999]\). This raises the question what the drivers of a successful environment for that asset class are?

Looking at emerging markets, Asia dominates fundraising and investment, having attracted the majority of total emerging market capital raised over the last 10 years. As Figure 4.1 exemplifies, Asian funds raised have increased substantially. In 2012, Asian private equity fundraising stood at 14.5\% of worldwide funds raised, with China taking a central role in the region’s growth. From 2007 to 2012, between half and two thirds of all funds raised in Asia have been raised in China and Hong Kong (see Figure 4.2). Despite the rapid growth of Asian private equity markets, international investments in the region are still in its infancy \([\text{Bruton et al.}, 1999]\): Most international investors remain under-allocated to investments in emerging markets, despite accounting

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\(^9\)Private equity for the purpose of this essay will refer to private equity investments at all stages of a company’s life, i.e. including venture capital (VC) at all stages (seed, startup and expansion stage), leveraged buyouts (LBOs), generalist private equity investing at all stages, fund of funds (FoF), secondary funds, as well as funds focused on turnaround, distressed, and special situations.
for more than a third of global GDP and two thirds of global GDP growth [Alexander & Kolb, 2012]. As international institutional investors seek to diversify their investments, they can’t help considering Asia in their portfolio. A survey among institutional investors by the Emerging Market Private Equity Association [Alexander & Kolb, 2012] shows that three-quarters of pension funds, asset managers and other sources of private equity funding are looking to increase their exposure to emerging markets in the next two years, raising again questions on the drivers of a successful environment for the asset class.

**Figure 4.1:** Asian Private Equity Fundraising compared to Worldwide Funds Raised

![Graph showing Asian private equity fundraising as a percentage of worldwide fundraising from 1990 to 2012.](image)

*Notes:* This figure shows all funds raised compared to worldwide private equity fundraising. Asian funds raised have increased substantially over the last decade. In 2012, Asian private equity fundraising was 14.5% of worldwide funds raised. Fundraising data are retrieved from Thomson Reuters’ private equity module and include 15,997 private equity funds raised from 1990 until 2012.

This essay aims to determine fund raising determinants in Asia as the largest emerging market for private equity compared to developed markets. Understanding and awareness of the determinants among investors is nec-
Figure 4.2: Asian Private Equity Fundraising compared to China/Hong Kong

![Graph showing Asian Private Equity Fundraising compared to China/Hong Kong](graph.png)

**Notes:** This figure shows all funds raised across Asia in Mio. USD compared to buyout and venture capital funds raised in China and Hong Kong. Funds raised in China and Hong Kong make up for a significant part of Asian fundraising. Between 2007 and 2012, between half and two thirds of all funds raised in Asia have been raised in China and Hong Kong. Fundraising data are retrieved from Thomson Reuters’ private equity module and include 4,132 private equity funds raised from 1990 until 2012.

Essary to invest in these markets. Only when the determinants and particularities are known, investors can adequately assess the attractiveness of emerging market investments, while on the other side policymakers can promote and stimulate the asset class in order to profit from a vibrant private equity market. A clear understanding of practicalities and pitfalls is critical, as market growth alone never guarantees investment success.

Results show that exit opportunities and the amount of credit provided by the banking sector are strong determinants of new funds raised overall. Interestingly, this is the case for both early stage (venture) and later stage investments (buyouts). Unlike developed markets, emerging
markets however are negatively impacted by the amount of credit provided by the banking sector: Funding of transactions stands in direct competition with banks in these markets. The more credit is provided by the banking sector, the less investment opportunities remain for private capital. The negative relationship with credit provided by the banking sector is also reflected in different business approaches. In developed markets, banks financially leverage private equity transactions to a substantial degree to magnify returns to investors. In emerging markets, private equity transactions use less leverage. Differentiating along investment stages, economic growth and research and development (R&D) expenditures are found to be of particular importance to venture capital (VC). For later stage leveraged buyouts, the degree of recent deals negatively impacts funds raised. As competition for attractive deals among private equity funds intensifies, investor return expectations deteriorate and funding is reduced as a consequence.

The essay is organized as follows. Existing findings on drivers of private equity activity are presented in section two. The third section describes the sample and data. Economic models and methodologies are outlined in section four, while empirical results are discussed in section five. Section 6 concludes the paper.

4.2 Factors that affect Private Equity Fundraising

This section lays out the theoretical underpinnings of the empirical analysis. Numerous both theoretical and empirical research on the determinants of private equity fundraising has identified various drivers behind private equity activity. Studies in the field use funds raised as a measure of private equity activity and are mostly related to the United States (U.S.) [Black & Gilson, 1998; Michelacci & Suarez, 2004; Gompers & Lerner, 2000; Lerner & Schoar, 2005; Kaplan & Schoar, 2005] and to a minor degree on Europe [Jeng & Wells, 2000; Balboa & Pellón, 2003].

Determinants that have been studied in economic literature can be classified as capital market related, macroeconomic, fiscal/legal environ-
ment and government intervention related, as well as process and culture related. Variables include past returns to investors (in countries with enough information on track records), initial public offerings (IPOs), recent investment activity, growth of gross domestic product (GDP), (short-term) interest rates, gross domestic savings volume, capital gains taxation, the legal system, fairness, protection of property rights, liberal bankruptcy laws, investment regulations, labour market policies, the maturity of the private equity market, its size, technological opportunities, risk capital culture and managerial talent.

With regard to capital market related variables (see Table 4.1), Gompers & Lerner [1999] find that within the financial sector in general, allocations across asset classes seem to be driven, at least in part, by past returns and in particular by the relative performance of various sectors over the recent past. Black & Gilson [1998] and Michelacci & Suarez [2004] highlight the important role of stock market activity, while Gompers & Lerner [2000] emphasize that risk capital flourishes in countries with deep and liquid stock markets. Kaplan & Schoar [2005] confirm the strong relation between private equity activity and stock market waves. Black & Gilson [1998] show that IPOs are the strongest driving force of private equity fundraising. Balboa & Pellón [2003] and Jeng & Wells [2000] show that for private equity fundraising, the investment activity of the previous period has a positive and significant impact on fundraising, confirming a liquidity effect in the markets. Their results confirm previous findings on IPOs as they show that the profitable exit mechanisms of divestments through the stock market and sales to third parties have a significant impact on funds raised.

Macroeconomic variables (see Table 4.1) are mainly related to the economic activity and are identified as a second driving force behind private equity fundraising. Romain & van Pottelsberghe de la Potterie [2003] as well as Balboa & Pellón [2003] find that private equity activity is highly pro-cyclical - it reacts positively and significantly to GDP growth. As the economy grows, the number and diversity of corporations as well
as entrepreneurial activity increases. Attractive investment opportunities arise which investors would want to take advantage of [Balboa & Pellón, 2003]. Romain & van Pottelsberghe de la Potterie [2003] provide evidence that short-term (one-year) interest rates have a positive impact on venture capital intensity: If short-term interest rates increase, the attractiveness of venture financing versus credit granted by traditional financial institutions increases from the entrepreneur’s viewpoint. With regard to long term interest rates, Gompers & Lerner [1999] find that an increase in interest rates decreases funds raised as long term interest rates of Treasury bonds are included as an investment alternative to venture capital from an investor’s point of view. Balboa & Pellón [2003] further find a positive influence of the gross domestic savings volume and a country’s aggregated gross private capital flows on the volume of funds raised as an increase in aggregated domestic savings and private capital flows increases the availability of funds for different asset classes, including private equity funds.

With regard to the fiscal/legal environment and government interventions (see Table 4.2), Gompers & Lerner [1999] find that decreases in capital gains tax rates appear to have a positive and important impact on commitments to new venture capital funds. Porta et al. [1997] and Porta et al. [1998] show that the legal environment determines the size and extent of a country’s capital market and local firms’ ability to receive outside funding. Cumming et al. [2006] show that the quality of a country’s legal system is much more directly connected to facilitating VC-backed IPO exits than the size of a country’s stock market. The data indicate legality is a central mechanism which mitigates agency problems between outside shareholders and entrepreneurs, thereby fostering the mutual development of IPO markets and venture capital markets. According to Lerner & Schoar [2005], the legal system appears to profoundly shape the transactions into which private equity groups enter. Efforts to address this problem by relying on ownership rather than contractual protections are only partially successful.
### Table 4.1: Literature Review: Capital Market related and Macroeconomic Determinants of Private Equity Fundraising

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Authors</th>
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</thead>
<tbody>
<tr>
<td>Past Returns to Investors</td>
<td>Allocations across asset classes seem to be driven by, at least in part, by past returns and, in particular, the relative performance of various sectors over the recent past.</td>
<td>Gompers &amp; Lerner [1999]</td>
</tr>
<tr>
<td>Initial public offerings (IPOs)</td>
<td>Positive impact of recent IPO activity on private equity fundraising</td>
<td>Black &amp; Gilson [1998]</td>
</tr>
<tr>
<td>Recent Investment Activity</td>
<td>Investment activity of the previous period has a positive and significant impact on fundraising, confirming a liquidity effect in the markets.</td>
<td>Balboa &amp; Pellón [2003]; Jeng &amp; Wells [2000]</td>
</tr>
<tr>
<td>Growth of Gross Domestic Product (GDP)</td>
<td>Private equity activity is highly pro-cyclical - it reacts positively and significantly to GDP growth.</td>
<td>Romain &amp; van Pottelsberghe de la Potterie [2003]; Balboa &amp; Pellón [2003]</td>
</tr>
<tr>
<td>Interest rates</td>
<td>Short-term (one-year) interest rates have a positive impact on venture capital intensity, while long term rates have a negative impact as they provide investment alternatives to private equity.</td>
<td>Romain &amp; van Pottelsberghe de la Potterie [2003]; Gompers &amp; Lerner [1999]</td>
</tr>
<tr>
<td>Gross Domestic Savings</td>
<td>Positive influence of the gross domestic savings volume on the volume of funds raised</td>
<td>Balboa &amp; Pellón [2003]</td>
</tr>
<tr>
<td>Gross Private Capital Flows</td>
<td>Private capital flows increase availability of funds for private equity</td>
<td>Balboa &amp; Pellón [2003]</td>
</tr>
</tbody>
</table>

*Notes:* Numerous both theoretical and empirical research on the determinants of private equity fundraising has identified various driving forces behind private equity fundraising. Most of the research concentrates on venture capital and is focused on developed markets, foremost the most dynamic market in the world, the U.S. Determinants that have been studied in economic literature from a theoretical as well as from an empirical perspective can be classified as *market related, macroeconomic, fiscal/legal environment and government intervention related* as well as *process and culture related.*
Glaeser et al. [2001] and Djankov et al. [2003] find that parties in common law-countries have greater ease in enforcing their rights from commercial contracts. Cumming et al. [2004] confirm that better laws facilitate faster deal screening and deal origination, a higher probability of syndication and a lower probability of potentially harmful co-investments, as well as facilitate board representation of the investor. Desai et al. [2003] explore the impact of the institutional environment on the nature of entrepreneurial activity across Europe. Greater fairness and greater protection of property rights increase entry rates, reduce exit rates and lower average firm size. Porta et al. [2002] and Lerner & Schoar [2005] notice higher valuation of firms in countries with better protection of minority shareholders, and weaker evidence of the benefits of higher cash flow ownership by controlling shareholders for corporate valuation. Armour & Cumming [2006] confirm that favourable fiscal and legal environments facilitate the establishment of venture capital and private equity funds and increase the supply of capital. Similarly, liberal bankruptcy laws stimulate entrepreneurialism and increase the demand for venture capital.

On the other side, Gompers & Lerner [1999] show that government investment regulations, such as the Department of Labor’s clarification of prudent man rule, which enables pension funds to freely invest in venture capital, has a generally positive effect on commitments to the industry. Blanchard et al. [1997] and Black & Gilson [1998] show that rigid labour market policies might negatively affect the attractiveness of a private equity market. Jeng & Wells [2000] show that labour market rigidities, government programs for entrepreneurship and bankruptcy procedures explain a significant share of cross country variations in venture capital intensity.

Private equity process and culture related variables (see Table 4.3) also seem to play an important role. Jeng & Wells [2000] find that the maturity of private equity markets, reflected by number of players and supporting institutions, such as investment banks, M&A boutiques, law
Table 4.2: Literature Review: Fiscal/Legal Environment and Government Intervention related Determinants of Private Equity Fundraising

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Gains Taxation</td>
<td>Decreases in capital gains tax rates appear to have a positive and important impact on commitments to new venture capital funds.</td>
<td>Gompers &amp; Lerner [1999]</td>
</tr>
<tr>
<td>Legal System</td>
<td>Legal environment determines the size and extent of a country’s capital market and local firm’s ability to receive outside funding.</td>
<td>Porta et al. [1997, 1998]; Glaeser et al. [2001]; Djankov et al. [2003]; Lerner &amp; Schoar [2005]; Cumming et al. [2004, 2006]</td>
</tr>
<tr>
<td>Fairness</td>
<td>Greater fairness and greater protection increase entry rates, reduce exit rates and lower average firm size.</td>
<td>Desai et al. [2003]</td>
</tr>
<tr>
<td>Protection of Property Rights</td>
<td>Higher valuation of firms in countries with better protection of minority shareholders, and weaker evidence of the benefits of higher cash flow ownership by controlling shareholders for corporate valuation.</td>
<td>Porta et al. [2002]; Desai et al. [2003]; Lerner &amp; Schoar [2005]; Groh &amp; Liechtenstein [2011]</td>
</tr>
<tr>
<td>Bankruptcy Laws</td>
<td>Liberal bankruptcy laws stimulate entrepreneurialism and increase the demand for venture capital.</td>
<td>Armour &amp; Cumming [2006]</td>
</tr>
<tr>
<td>Investment Regulations</td>
<td>Government investment regulations, such as the Department of Labor clarification of prudent man rule, which enables pension funds to freely invest in venture capital, has a generally positive effect on commitments to the industry by increasing the supply of funds.</td>
<td>Gompers &amp; Lerner [1999]</td>
</tr>
<tr>
<td>Labour Market Policies</td>
<td>Rigid labour market policies might negatively affect the attractiveness of a private equity market.</td>
<td>Blanchard et al. [1997]; Black &amp; Gilson [1998]; Jeng &amp; Wells [2000]</td>
</tr>
</tbody>
</table>

Notes: Numerous both theoretical and empirical research on the determinants of private equity fundraising has identified various driving forces behind private equity fundraising. Most of the research concentrates on venture capital and is focused on developed markets, foremost the most dynamic market in the world, the U.S. Determinants that have been studied in economic literature from a theoretical as well as from an empirical perspective can be classified as market related, macroeconomic, fiscal/legal environment and government intervention related as well as process and culture related.
firms, auditors (reliability of accounting procedures) and consultants are important to create deal flow and exit transactions. Chemla [2005] finds evidence for asset size to be an important determinant of pension fund decisions to invest in private equity, but also of how much to invest in this type of asset. Private equity investments require costly management, a significant fraction of which may be thought of as fixed cost. This suggests that if funds are too small, it is not on the scope of internationally acting institutional investors. Romain & van Pottelsberghe de la Potterie [2003] further find that indicators of technological opportunities, such as the growth rate of R&D investment, the stock of knowledge and the number of patents positively and significantly affect the relative level of VC. With regard to the human and social environment, factors associated with the entrepreneurial environment also explain a substantial part of cross-country variations in VC intensity. The entrepreneurial environment is examined by Baughn & Neupert [2003] and Lee et al. [2009] who argue that national cultures affect the level of acceptance of a risk capital culture by shaping both individual orientation and environmental conditions.

Research with regard to emerging economies is scarce. Some research has been performed on transition countries such as Central and Eastern Europe (CEE). Farag et al. [2004] focus on the private equity markets in Hungary, the Czech Republic and Poland, and compare them with Germany. The major disadvantage of these countries is seen in the availability of managerial talent to manage the private equity backed companies. This is consistent with the findings of Bliss [1999], Karsai & Wright [1998] and Klonowski [2007] with regard to CEE countries and with Groh & Liechtenstein [2011] for a wider selection of emerging economies. Furthermore, as access to debt financing is limited, reaching the desired returns by leveraging transactions is hindered. The authors suggest that substantial growth in the supply of risk capital could be achieved by legal and institutional improvements. Johnson et al. [1999], Klonowski
Table 4.3: Literature Review: Process and Culture related Determinants of Private Equity Fundraising

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maturity of the Private Equity Market</td>
<td>Maturity of private equity market, reflected by number of players and supporting institutions, such as investment banks, M&amp;A boutiques, law firms, auditors and consultants are important to create deal flow and exit transactions.</td>
<td>Jeng &amp; Wells [2000]</td>
</tr>
<tr>
<td>Size of the Private Equity Market</td>
<td>Private equity investments require costly management, a significant fraction of which may be thought of as a fixed cost. This suggests that if funds are too small, it is not on the scope of internationally acting institutional investors.</td>
<td>Chemla [2005]</td>
</tr>
<tr>
<td>Technological Opportunities</td>
<td>Indicators of technological opportunities, such as the growth rate of R&amp;D investment, the stock of knowledge and the number of triadic patents affect positively and significantly the relative level of venture capital.</td>
<td>Romain &amp; van Pottelsberghe de la Potterie [2003]</td>
</tr>
<tr>
<td>Risk Capital Culture</td>
<td>National cultures affect the level of acceptance of a risk capital culture by shaping both individual orientation and environmental conditions.</td>
<td>Baughn &amp; Neupert [2003]; Lee et al. [2009]</td>
</tr>
<tr>
<td>Managerial Talent</td>
<td>Major disadvantage of Central and Eastern European countries as well as emerging markets in general is seen in the availability of managerial talent to manage the private equity backed companies.</td>
<td>Karsai &amp; Wright [1998]; Bliss [1999]; Farag et al. [2004]; Klonowski [2007]; Groh &amp; Liechtenstein [2011]</td>
</tr>
</tbody>
</table>

Notes: Numerous both theoretical and empirical research on the determinants of private equity fundraising has identified various driving forces behind private equity fundraising. Most of the research concentrates on venture capital and is focused on developed markets, foremost the most dynamic market in the world, the U.S. Determinants that have been studied in economic literature from a theoretical as well as from an empirical perspective can be classified as market related, macroeconomic, fiscal/legal as well as process and culture related.
[2007] and Groh & Liechtenstein [2011] emphasize the importance of the protection of property rights while their findings suggest that access to debt financing does not appear to explain differences in levels of fundraising. Furthermore, the availability of public funding and subsidies play no role in fundraising (not only in emerging countries): Public money does not attract private money [Groh & Liechtenstein, 2011; Rin et al., 2005; Armour & Cumming, 2006; Groh & Liechtenstein, 2011].

4.3 Sample and Data

Data on fundraising used for this study is based on Thomson Reuters’ private equity module\textsuperscript{10} and is reconciled with data from national private equity and venture capital associations in order to avoid potential biases. Figure 4.2 gives an overview on the amount of funds raised across all Asia. Compared to worldwide private equity fundraising, Asian funds raised have increased substantially over the last decade. In 2012, Asian private equity fundraising accounted for 14.5\% of worldwide funds raised as Figure 4.1 demonstrates. China takes a central role in the region’s growth. From 2007 to 2012, between half and two thirds of all funds raised in Asia have been raised in China and Hong Kong (see again Figure 4.2).

The panel dataset for this essay includes private equity funds raised from 2000 until 2011. Table 4.4 shows funds raised across fund types in Asia in Mio. USD. Funds include all stages of private equity investments, i.e. venture capital (VC) at all stages (seed, startup and expansion stage), leveraged buyouts (LBOs), generalist private equity investing at all stages, fund of funds (FoF), secondary funds, as well as funds focused on turnaround, distressed, and special situations. Mezzanine and real estate is excluded for the analysis due to the unique characteristics of the asset class. Information on new funds raised is aggregated for each country. In order to take into account the unique characteristics of the

\textsuperscript{10}Thomson Reuters’ private equity module, formerly VentureXpert, is available as an add-on to ThomsonONE.com Investment Banking and includes over 30 years of daily-updated history covering buyouts, private equity funds, firms, executives, portfolio companies and limited partners around the world.
business models along various life stages, I differentiate between venture capital and buyouts.

Countries for the analysis of Asian private equity markets include China, India, South Korea, Vietnam, Singapore and Hong Kong\textsuperscript{11} (see \textbf{Table 4.5}, \textbf{Table 4.6} and \textbf{Table 4.7}). Developed markets for private equity include the United States (U.S.), the United Kingdom (U.K.), Canada, Israel, Japan, Australia, Germany, France, Spain, Italy, Sweden, Norway, Finland, Austria and Switzerland (see \textbf{Table 4.8}, \textbf{Table 4.9} and \textbf{Table 4.10}).

Descriptive statistics show that fundraising in the U.S. and the U.K. - as the two leading markets for private equity - decreased significantly after the two financial crises of the last decade began in 2000 and in 2008 (see \textbf{Figure 4.3}). In the meantime, funds raised in emerging Asia’s leading markets of China and India could increase substantially. A similar pattern can be observed for buyouts (see \textbf{Figure 4.4}). Both overall private equity and buyout volumes adjusted by GDP are at low levels compared to developed markets. For venture capital, on the contrary, China and India fundraising levels increased massively over the past decade and even surpassed the U.K. and the U.S. in the case of China (see \textbf{Figure 4.5}).

\textsuperscript{11}Countries with none or marginal funds raised are not included in the analysis.
### Table 4.4: Asian Private Equity Fundraising across Fund Type

<table>
<thead>
<tr>
<th>Year</th>
<th>Funds raised in Mio. USD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>1990</td>
<td>562.68</td>
</tr>
<tr>
<td>1991</td>
<td>210.75</td>
</tr>
<tr>
<td>1992</td>
<td>857.29</td>
</tr>
<tr>
<td>1993</td>
<td>1,023.95</td>
</tr>
<tr>
<td>1994</td>
<td>3,619.69</td>
</tr>
<tr>
<td>1995</td>
<td>1,624.98</td>
</tr>
<tr>
<td>1996</td>
<td>2,140.67</td>
</tr>
<tr>
<td>1997</td>
<td>6,435.23</td>
</tr>
<tr>
<td>1998</td>
<td>6,243.90</td>
</tr>
<tr>
<td>1999</td>
<td>9,960.90</td>
</tr>
<tr>
<td>2000</td>
<td>17,558.76</td>
</tr>
<tr>
<td>2001</td>
<td>7,222.66</td>
</tr>
<tr>
<td>2002</td>
<td>3,525.49</td>
</tr>
<tr>
<td>2003</td>
<td>5,877.08</td>
</tr>
<tr>
<td>2004</td>
<td>7,833.62</td>
</tr>
<tr>
<td>2005</td>
<td>21,688.20</td>
</tr>
<tr>
<td>2006</td>
<td>26,182.04</td>
</tr>
<tr>
<td>2007</td>
<td>45,779.67</td>
</tr>
<tr>
<td>2008</td>
<td>59,302.28</td>
</tr>
<tr>
<td>2009</td>
<td>20,270.01</td>
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<tr>
<td>2010</td>
<td>37,364.25</td>
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<tr>
<td>2011</td>
<td>47,206.72</td>
</tr>
<tr>
<td>2012</td>
<td>42,116.64</td>
</tr>
</tbody>
</table>

Notes: This table shows funds raised across fund types in Asia in Mio. USD. Data are retrieved from Thomson Reuters’ private equity module and include 4,132 private equity funds raised from 1990 until 2012. Fund types include buyout, venture capital, generalist private equity, fund of funds (FoF), mezzanine, real estate as well as other private equity.
Table 4.5: Asian Emerging Markets Private Equity Fundraising across Countries

<table>
<thead>
<tr>
<th>Year</th>
<th>China</th>
<th>India</th>
<th>South Korea</th>
<th>Vietnam</th>
<th>Singapore</th>
<th>Hong Kong</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>0.00033</td>
<td>0.00187</td>
<td>0.00339</td>
<td>0.00000</td>
<td>0.02913</td>
<td>0.03407</td>
</tr>
<tr>
<td>2001</td>
<td>0.00010</td>
<td>0.00091</td>
<td>0.00128</td>
<td>0.00251</td>
<td>0.00863</td>
<td>0.01362</td>
</tr>
<tr>
<td>2002</td>
<td>0.00029</td>
<td>0.00047</td>
<td>0.00103</td>
<td>0.00053</td>
<td>0.00177</td>
<td>0.00763</td>
</tr>
<tr>
<td>2003</td>
<td>0.00011</td>
<td>0.00072</td>
<td>0.00199</td>
<td>0.02250</td>
<td>0.00133</td>
<td>0.00643</td>
</tr>
<tr>
<td>2004</td>
<td>0.00016</td>
<td>0.00092</td>
<td>0.00133</td>
<td>0.00000</td>
<td>0.00245</td>
<td>0.01334</td>
</tr>
<tr>
<td>2005</td>
<td>0.00052</td>
<td>0.00251</td>
<td>0.00277</td>
<td>0.00000</td>
<td>0.00729</td>
<td>0.05324</td>
</tr>
<tr>
<td>2006</td>
<td>0.00186</td>
<td>0.00349</td>
<td>0.00514</td>
<td>0.00530</td>
<td>0.00715</td>
<td>0.02872</td>
</tr>
<tr>
<td>2007</td>
<td>0.00216</td>
<td>0.00339</td>
<td>0.00338</td>
<td>0.00880</td>
<td>0.00264</td>
<td>0.10147</td>
</tr>
<tr>
<td>2008</td>
<td>0.00324</td>
<td>0.00509</td>
<td>0.00417</td>
<td>0.00415</td>
<td>0.00921</td>
<td>0.10211</td>
</tr>
<tr>
<td>2009</td>
<td>0.00189</td>
<td>0.00302</td>
<td>0.00319</td>
<td>0.00021</td>
<td>0.00730</td>
<td>0.04444</td>
</tr>
<tr>
<td>2010</td>
<td>0.00474</td>
<td>0.00257</td>
<td>0.00030</td>
<td>0.00042</td>
<td>0.01027</td>
<td>0.03031</td>
</tr>
<tr>
<td>2011</td>
<td>0.00732</td>
<td>0.00175</td>
<td>0.00104</td>
<td>0.00139</td>
<td>0.00462</td>
<td>0.07034</td>
</tr>
</tbody>
</table>

Notes: This table shows funds raised across Asian emerging markets for private equity as per thousand of GDP. Data are retrieved from Thomson Private Equity Module and are compared as well as complemented with data from national private equity and venture capital associations in order to validate data and avoid potential biases.

To explain these differences in fundraising and to identify the determinants and differences in the approach taken towards private equity, I build on existing research as laid out in the previous section. Data for the independent variables are retrieved from Standard & Poor’s, the International Monetary Fund, Thomson Reuters, the World Bank, OECD National Accounts, United Nations Educational, as well as the UNESCO Institute for Statistics (see Table 4.11 for an overview). The following section presents the econometric models applied to the analysis.

4.4 Models and Methodology

This essay uses fixed effects linear panel data models for the analysis. Panel data allow me to control for the effects of variables that specifically affect the dependent variable of each country but are unobservable (the so-called individual heterogeneity); meaning that the coefficients estimated reflect the real impact of x on y [Balboa & Pellón, 2003]. Further-
Table 4.6: Asian Emerging Markets Venture Capital (VC) Fundraising across Countries

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual volume of funds raised (normalised by GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>China</td>
</tr>
<tr>
<td>2000</td>
<td>0.00032</td>
</tr>
<tr>
<td>2001</td>
<td>0.00010</td>
</tr>
<tr>
<td>2002</td>
<td>0.00029</td>
</tr>
<tr>
<td>2003</td>
<td>0.00007</td>
</tr>
<tr>
<td>2004</td>
<td>0.00006</td>
</tr>
<tr>
<td>2005</td>
<td>0.00048</td>
</tr>
<tr>
<td>2006</td>
<td>0.00120</td>
</tr>
<tr>
<td>2007</td>
<td>0.00186</td>
</tr>
<tr>
<td>2008</td>
<td>0.00184</td>
</tr>
<tr>
<td>2009</td>
<td>0.00150</td>
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<tr>
<td>2010</td>
<td>0.00273</td>
</tr>
<tr>
<td>2011</td>
<td>0.00384</td>
</tr>
</tbody>
</table>

Notes: This table shows funds raised across Asian emerging markets for private equity as per thousand of GDP. Data are retrieved from Thomson Private Equity Module and are compared as well as complemented with data from national private equity and venture capital associations in order to validate data and avoid potential biases.

more, it offers a large amount of information, which allows for increases to the degree of freedom of the tests, reduces collinearity among the explanatory variables, and controls the effect of omitted or unobservable variables.

4.4.1 Econometric Models

To analyze the effects of socio-economic criteria on investor engagement with private equity in emerging Asian markets, four models are proposed. These models include the criteria that proved to have an impact on funds raised in emerging markets in a first empirical model covering a large variety of criteria based on the literature review and available data. Only the criteria that in the first round showed to be of importance for emerging markets were considered in later models. These criteria cover capital market related, macroeconomic, R&D related, as well as business environment related criteria. In each model, the
Table 4.7: Asian Emerging Markets Leveraged Buyout (LBO) Capital Fundraising across Countries

<table>
<thead>
<tr>
<th>Year</th>
<th>China</th>
<th>India</th>
<th>South Korea</th>
<th>Vietnam</th>
<th>Singapore</th>
<th>Hong Kong</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
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<td>0.00000</td>
<td>0.00019</td>
<td>0.00000</td>
<td>0.00000</td>
<td>0.01187</td>
</tr>
<tr>
<td>2001</td>
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<td>0.00000</td>
<td>0.00000</td>
<td>0.00000</td>
<td>0.00000</td>
<td>0.00000</td>
</tr>
<tr>
<td>2002</td>
<td>0.00000</td>
<td>0.00000</td>
<td>0.00000</td>
<td>0.00000</td>
<td>0.00000</td>
<td>0.00000</td>
</tr>
<tr>
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<td>0.00004</td>
<td>0.00000</td>
<td>0.00003</td>
<td>0.00000</td>
<td>0.00000</td>
<td>0.00505</td>
</tr>
<tr>
<td>2004</td>
<td>0.00009</td>
<td>0.00000</td>
<td>0.00041</td>
<td>0.00000</td>
<td>0.00000</td>
<td>0.01015</td>
</tr>
<tr>
<td>2005</td>
<td>0.00004</td>
<td>0.00018</td>
<td>0.00051</td>
<td>0.00000</td>
<td>0.00000</td>
<td>0.03073</td>
</tr>
<tr>
<td>2006</td>
<td>0.00057</td>
<td>0.00000</td>
<td>0.00182</td>
<td>0.00038</td>
<td>0.00144</td>
<td>0.01054</td>
</tr>
<tr>
<td>2007</td>
<td>0.00019</td>
<td>0.00032</td>
<td>0.00039</td>
<td>0.00000</td>
<td>0.00000</td>
<td>0.07670</td>
</tr>
<tr>
<td>2008</td>
<td>0.00114</td>
<td>0.00133</td>
<td>0.00081</td>
<td>0.00000</td>
<td>0.00047</td>
<td>0.07245</td>
</tr>
<tr>
<td>2009</td>
<td>0.00024</td>
<td>0.00109</td>
<td>0.00271</td>
<td>0.00000</td>
<td>0.00146</td>
<td>0.03658</td>
</tr>
<tr>
<td>2010</td>
<td>0.00123</td>
<td>0.00056</td>
<td>0.00000</td>
<td>0.00000</td>
<td>0.00056</td>
<td>0.01705</td>
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<tr>
<td>2011</td>
<td>0.00163</td>
<td>0.00024</td>
<td>0.00067</td>
<td>0.00000</td>
<td>0.00050</td>
<td>0.05414</td>
</tr>
</tbody>
</table>

Notes: This table shows funds raised across Asian emerging markets for private equity as per thousand of GDP. Data are retrieved from Thomson Private Equity Module and are compared as well as complemented with data from national private equity and venture capital associations in order to validate data and avoid potential biases.

dependent variable $N_{fund_{it}}$ represents annual funds raised by all private equity organizations in a country $i$ in a particular year $t$. In order to control for the natural growth of annual funds raised due to the simple passing of time, a deterministic time trend $Trend_t$ is added to all models.

The first model includes, as independent variables, criteria related to the capital market. Criteria include the market capitalization of listed companies $MarketCap_{it}$, the amount of credit provided by the banking sector $BankCredit_{it}$, the recent private equity deal flow $Inv_{it-1,it}$ as well as the number of initial public offerings $IPOs_{it-1,it}$ as a measure of exit opportunities.

Model I: $N_{fund_{it}} = \alpha + \beta_1 MarketCap_{it} + \beta_2 BankCredit_{it}$
$$+ \beta_3 Inv_{it-1,it} + \beta_4 IPOs_{it-1,it} + Trend_t + \eta_i + \varepsilon_{it}$$ (15)
Table 4.8: Developed Markets Private Equity Fundraising across Countries

<table>
<thead>
<tr>
<th>Year</th>
<th>U.S.</th>
<th>U.K.</th>
<th>CA</th>
<th>ISR</th>
<th>JPN</th>
<th>AUS</th>
<th>GER</th>
<th>FRA</th>
<th>ESP</th>
<th>ITA</th>
<th>SWE</th>
<th>NOR</th>
<th>FIN</th>
<th>AUT</th>
<th>SUI</th>
</tr>
</thead>
<tbody>
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<td>0.01095</td>
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<td>0.00171</td>
<td>0.02452</td>
</tr>
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<td>0.00207</td>
<td>0.00226</td>
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</tr>
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<td>0.00153</td>
<td>0.00110</td>
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<td>0.00062</td>
<td>0.00050</td>
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<td>0.00183</td>
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</tr>
<tr>
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<td>0.01340</td>
<td>0.00509</td>
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<td>0.00026</td>
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<td>0.00038</td>
<td>0.00460</td>
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</tr>
<tr>
<td>2004</td>
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<td>0.00964</td>
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<td>0.00189</td>
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<td>0.00071</td>
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<td>0.00693</td>
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<td>0.00031</td>
<td>0.01609</td>
</tr>
<tr>
<td>2007</td>
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<td>0.03137</td>
<td>0.00664</td>
<td>0.00828</td>
<td>0.00025</td>
<td>0.01289</td>
<td>0.00186</td>
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<td>0.00098</td>
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<td>0.00191</td>
<td>0.00593</td>
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<td>0.00104</td>
<td>0.01821</td>
<td>0.00670</td>
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<td>2009</td>
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<td>0.00271</td>
<td>0.00148</td>
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<td>0.00168</td>
<td>0.00028</td>
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<td>0.01787</td>
</tr>
<tr>
<td>2010</td>
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<td>0.00828</td>
<td>0.00041</td>
<td>0.00008</td>
<td>0.00254</td>
<td>0.00072</td>
<td>0.00082</td>
<td>0.00078</td>
<td>0.00047</td>
<td>0.00081</td>
<td>0.00056</td>
<td>0.00278</td>
<td>0.00000</td>
<td>0.00931</td>
</tr>
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<td>0.00232</td>
<td>0.00023</td>
<td>0.00098</td>
<td>0.00095</td>
<td>0.00265</td>
<td>0.00037</td>
<td>0.00020</td>
<td>0.00216</td>
<td>0.00381</td>
<td>0.00214</td>
<td>0.00037</td>
<td>0.00211</td>
</tr>
</tbody>
</table>

Notes: This table shows funds raised across developed markets for private equity as per thousand of GDP. Data are retrieved from Thomson Private Equity Module and are compared as well as complemented with data from national private equity and venture capital associations in order to validate data and avoid potential biases.
Table 4.9: Developed Markets Venture Capital Fundraising across Countries

<table>
<thead>
<tr>
<th>Year</th>
<th>U.S.</th>
<th>U.K.</th>
<th>CA</th>
<th>ISR</th>
<th>JPN</th>
<th>AUS</th>
<th>GER</th>
<th>FRA</th>
<th>ESP</th>
<th>ITA</th>
<th>SWE</th>
<th>NOR</th>
<th>FIN</th>
<th>AUT</th>
<th>SUI</th>
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</thead>
<tbody>
<tr>
<td>2000</td>
<td>.01114</td>
<td>.00761</td>
<td>.00203</td>
<td>.02691</td>
<td>.00052</td>
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<td>.00045</td>
<td>.00138</td>
<td>.00091</td>
<td>.00403</td>
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<td>2003</td>
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<td>.00455</td>
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<td>.00028</td>
<td>.00008</td>
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<td>.00036</td>
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<td>.00013</td>
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<td>.00007</td>
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<tr>
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<td>.00076</td>
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<td>.00135</td>
<td>.00019</td>
<td>.00008</td>
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<tr>
<td>2008</td>
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<td>.00125</td>
<td>.00204</td>
<td>.00872</td>
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<td>.00039</td>
<td>.00032</td>
<td>.00072</td>
<td>.00078</td>
<td>.00002</td>
<td>.00063</td>
<td>.00118</td>
<td>.00178</td>
<td>.00002</td>
<td>.00016</td>
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<tr>
<td>2009</td>
<td>.00207</td>
<td>.00071</td>
<td>.00271</td>
<td>.00126</td>
<td>.00002</td>
<td>.00028</td>
<td>.00008</td>
<td>.00093</td>
<td>.00015</td>
<td>.00009</td>
<td>.00077</td>
<td>.00101</td>
<td>.00046</td>
<td>.00030</td>
<td>.00013</td>
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<tr>
<td>2010</td>
<td>.00159</td>
<td>.00054</td>
<td>.00247</td>
<td>.00022</td>
<td>.00004</td>
<td>.00016</td>
<td>.00027</td>
<td>.00014</td>
<td>.00058</td>
<td>.00000</td>
<td>.00000</td>
<td>.00022</td>
<td>.00034</td>
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<tr>
<td>2011</td>
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<td>.00052</td>
<td>.00138</td>
<td>.00232</td>
<td>.00003</td>
<td>.00004</td>
<td>.00034</td>
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<td>.00000</td>
<td>.00000</td>
<td>.00039</td>
<td>.00077</td>
<td>.00013</td>
<td>.00010</td>
</tr>
</tbody>
</table>

Notes: This table shows funds raised across developed markets for private equity as per thousand of GDP. Data are retrieved from Thomson Private Equity Module and are compared as well as complemented with data from national private equity and venture capital associations in order to validate data and avoid potential biases.
Table 4.10: Developed Markets Leveraged Buyout (LBO) Fundraising across Countries

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual volume of funds raised (normalised by GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>U.S.</td>
</tr>
<tr>
<td>2000</td>
<td>.00953</td>
</tr>
<tr>
<td>2002</td>
<td>.00464</td>
</tr>
<tr>
<td>2003</td>
<td>.00350</td>
</tr>
<tr>
<td>2004</td>
<td>.00652</td>
</tr>
<tr>
<td>2005</td>
<td>.01132</td>
</tr>
<tr>
<td>2006</td>
<td>.01591</td>
</tr>
<tr>
<td>2008</td>
<td>.01734</td>
</tr>
<tr>
<td>2010</td>
<td>.00517</td>
</tr>
<tr>
<td>2011</td>
<td>.00756</td>
</tr>
</tbody>
</table>

Notes: This table shows funds raised across developed markets for private equity as per thousand of GDP. Data are retrieved from Thomson Private Equity Module and are compared as well as complemented with data from national private equity and venture capital associations in order to validate data and avoid potential biases.
**Figure 4.3:** Asian Private Equity Fundraising adjusted by GDP compared to Developed Markets

![Graph showing private equity fundraising adjusted by GDP for China, India, United States, and United Kingdom from 2000 to 2011](image)

**Notes:** This figure shows annual private equity fundraising adjusted by GDP in emerging Asian markets of China and India compared to the U.S. and the U.K. Evidence suggest that there is still massive potential for private equity market penetration in emerging Asian markets.

The *market capitalization of listed companies* ($MarketCap_{it}$) (also known as market value) is the share price times the number of shares outstanding. Listed domestic companies\(^\text{12}\) are the domestically incorporated companies listed on the country’s stock exchanges at the end of the year. In my analysis, the market capitalization of listed companies is a proxy for the development of the respective capital markets. Private equity transactions are dependent on a variety of financial intermediaries such as mergers and acquisitions (M&A) intermediaries, lawyers and advisory services in order to execute transactions. The more developed a country’s capital markets, the easier it is for private equity firms to

---

\(^\text{12}\)Listed companies do not include investment companies, mutual funds, or other collective investment vehicles.
**Figure 4.4:** Asian Leveraged Buyout (LBO) Fundraising adjusted by GDP compared to Developed Markets

![Graph showing leveraged buyout fundraising adjusted by GDP from 2000 to 2011 for China, India, United States, and the United Kingdom.]

**Notes:** This figure shows annual leveraged buyout (LBO) fundraising adjusted by GDP in emerging Asian markets of China and India compared to the U.S. and the U.K. Evidence suggest that there is still massive potential for private equity market penetration in emerging Asian markets.

Implement interesting transaction opportunities. Another important criterion related to the capital market is the *amount of credit provided by the banking sector* (*BankCredit*_it). Private equity business models in developed markets depend to a significant degree on the use of financial leverage. The amount of credit provided by the banking sector is therefore an important criterion for the availability of external financing. Further, the amount of credit by banks can be regarded as an alternative source of funding for businesses, substituting private capital. Important factors with regard to the investment opportunities as well as exit channels are considered with the *private equity deal flow* (*Inv*_it−1, _it) and the *number of initial public offerings* (*IPOs*_it−1, _it). IPOs are considered to be the most attractive exit channel for private
**Figure 4.5:** Asian Venture Capital Fundraising adjusted by GDP compared to Developed Markets

![Graph showing annual venture capital fundraising adjusted by GDP in emerging Asian markets of China and India compared to the U.S. and the U.K. Descriptive statistics show that compared to developed markets, Asian private equity markets are focused on venture capital. Market penetration levels in India and China have caught up to the U.S. and the U.K. in recent years, even surpassing the U.K. since 2004 and 2006 respectively.](image)

*Notes:* This figure shows annual venture capital fundraising adjusted by GDP in emerging Asian markets of China and India compared to the U.S. and the U.K. Descriptive statistics show that compared to developed markets, Asian private equity markets are focused on venture capital. Market penetration levels in India and China have caught up to the U.S. and the U.K. in recent years, even surpassing the U.K. since 2004 and 2006 respectively.

Equity funds as achieved prices are considered to be highest when going public. Balboa & Pellón [2003] showed positive and significant effects of lagged aggregated investments and divestments on new funds raised.

The second model adds the macroeconomic criterion of GDP growth \((GDP_{it})^{13}\) to the first model. If the economy grows, investment op-

---

13 Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2000 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.
opportunities arise which investors could take advantage of.

\[ \text{Model II} : \quad \text{Net Fund}_{it} = \alpha + \beta_1 \text{MarketCap}_{it} + \beta_2 \text{BankCredit}_{it} \]
\[ + \beta_3 \text{Inv}_{it-1, it} + \beta_4 \text{IPOs}_{it-1, it} + \beta_5 \text{GDP}_G_{it} + \text{Trend}_t + \eta_i + \varepsilon_{it} \]  

(16)

The third model adds research and development expenditures \((R&D_{it})^{14}\). Especially for venture capital, R&D expenditures are expected to lead to new business concepts with a need for financing and therefore increased investment opportunities. Innovations and R&D are also important for established businesses to maintain brand names and strong market positions, factors which attract later stage private equity investors.

\[ \text{Model III} : \quad \text{Net Fund}_{it} = \alpha + \beta_1 \text{MarketCap}_{it} + \beta_2 \text{BankCredit}_{it} \]
\[ + \beta_3 \text{Inv}_{it-1, it} + \beta_4 \text{IPOs}_{it-1, it} + \beta_5 \text{GDP}_G_{it} + \beta_6 R&D_{it} + \text{Trend}_t + \eta_i + \varepsilon_{it} \]  

(17)

Finally, I construct a model with criteria related to the environment to conduct business. Legal rights \((\text{Legal}_{it})^{15}\), the time to start a business \((\text{Time}_{it})\) and the cost to start a business \((\text{Cost}_{it})^{16}\). Numerous studies show the importance of the quality of a country’s legal system for its capital markets. Without proper legal protection and the according en-

\(^{14}\)Expenditures for research and development are current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications. R&D covers basic research, applied research, and experimental development.

\(^{15}\)The strength of legal rights index is issued by the World Bank and measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending. The index ranges from 0 to 10, with higher scores indicating that these laws are better designed to expand access to credit.

\(^{16}\)Cost to register a business is normalized by presenting it as a percentage of gross national income (GNI) per capita.
forcement possibilities, doing business is strongly hampered. Especially for private equity business models, based on long-term relationships with institutional investors, investors rely on their agents, and the general partners themselves rely on management teams. If investors are not confident that claims are well protected in a particular country and can be enforced if necessary, they refuse to allocate capital [Groh et al., 2012]. A further constraint to efficient entrepreneurial activity is bureaucracy in the form of excessive rules and procedural requirements, multiple institutions from which approvals are needed and excessive documentation requirements. The time and cost to start a business takes these factors into account and is assumed to play an important role for early stage venture investments.

\[
Model IV: \quad Nfund_{it} = \alpha + \beta_1 MarketCap_{it} + \beta_2 BankCredit_{it} \\
+ \beta_3 Inv_{it-1, it} + \beta_4 IPOs_{it-1, it} + \beta_5 GDPG_{it} \\
+ \beta_6 R&\bar{D}_{it} + \beta_7 Legal_{it} + \beta_8 Time_{it} + \beta_9 Cost_{it} \\
+ Trend_{t} + \eta_i + \varepsilon_{it} \tag{18}
\]

Table 4.11 gives an overview on the variables included in the analysis and sources of information.

4.4.2 Random Effects vs. Fixed Effects Model

Prior to the estimation of the above models, the independent variables are checked for collinearity. Neither simple correlations between pairs of variables nor the joint effect of all variables on investments show any signs of multicollinearity. My linear panel date regression to be estimated takes the form

\[
y_{it} = x'_{it}\beta + \eta_i + \varepsilon_{it} \quad i = 1, 2, ..., N; t = 1, 2, ..., T \tag{19}
\]
Table 4.11: Variable Descriptions

<table>
<thead>
<tr>
<th>Model</th>
<th>Variable</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model I</td>
<td>Market capitalisation of listed companies (adjusted by GDP)</td>
<td>Standard &amp; Poor’s, Global Stock Markets Factbook, supplemental S&amp;P data</td>
</tr>
<tr>
<td></td>
<td>Domestic credit provided by banking sector (% of GDP)</td>
<td>International Monetary Fund, International Financial Statistics</td>
</tr>
<tr>
<td></td>
<td>Investment deal flow: Recent IPO activity backed by private equity (IPOs,</td>
<td>Thomson Reuters, World Bank and OECD National Accounts</td>
</tr>
<tr>
<td></td>
<td>secondaries, trade sales as % of GDP)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exit opportunities via IPOs: Initial public offerings (IPO market values as</td>
<td>Thomson Reuters, World Bank and OECD National Accounts</td>
</tr>
<tr>
<td></td>
<td>% of GDP)</td>
<td></td>
</tr>
<tr>
<td>Model II</td>
<td>Gross domestic product (GDP) growth (annual %)</td>
<td>World Bank and OECD National Accounts</td>
</tr>
<tr>
<td>Model III</td>
<td>Research and development (R&amp;D) expenditure (% of GDP)</td>
<td>United Nations Educational, Scientific, and Cultural Organization</td>
</tr>
<tr>
<td></td>
<td>(UNESCO) Institute for Statistics</td>
<td></td>
</tr>
<tr>
<td>Model IV</td>
<td>Strength of legal rights index (0=weak to 10=strong)</td>
<td>World Bank, Doing Business project</td>
</tr>
<tr>
<td></td>
<td>Time required to start a business (days)</td>
<td>World Bank, Doing Business project</td>
</tr>
<tr>
<td></td>
<td>Cost of business start-up procedures (% of GNI per capita)</td>
<td>World Bank, Doing Business project</td>
</tr>
</tbody>
</table>

Notes: The table shows the variables used in this study to explain private equity fundraising in Asia. I would like to thank the World Bank Group for granting access to the diversity of databases regarding the above variables.
observing an endogenous variable, $y_{it}$, and a vector of explanatory variables, $x_{it}$. The sub index $i$ refers to the individual country and the sub index $t$ to the respective year. The term $\eta_i$ represents the specific effects of each country which are not observable and which are assumed to be constant through time for the same country.

There are two approaches to this equation. In the fixed effects approach, there is no need for parametric assumptions on the conditional distribution of unobservable heterogeneity ($\eta_i$), given the explanatory variables. In this case, the vector $\eta_i$ is a group of $N$ individual fixed effects which can be estimated along with the vector of parameters $\beta$. In the random effects approach, a parametric specification for the conditional distribution of unobservable individual effects $\eta_i$ is imposed, in such a way that they are realisations of individual effects which follow a certain distribution. Finally, $\eta_{it}$ is a zero average residual and variance $\sigma^2_\varepsilon$, $\varepsilon_{it} \sim N(0, \sigma^2_\varepsilon)$. 

To estimate this equation it is important to know whether the group of explanatory variables $x_{it}$ is correlated or not with the individual effects $\varepsilon_{it}$, as this would condition the most appropriate estimation method. If the correlation is different from zero, an ordinary least squares (OLS) estimation is consistent, but not efficient, being necessary to eliminate the individual effects. Traditionally, this is done by transforming the data into deviations with respect to the averages of each individual, and the resulting OLS is denominated as being of fixed or intra-group effect. If, on the other hand, the individual effects can be considered as random with respect to the explanatory variables, thus, $E(x_{it}u_{it}) = 0$ where $u_{it} = \eta_i + \varepsilon_{it}$, the errors are correlated in time for each individual, which does not support hypothesis $E(x_{it}u_{it}) = 0$ for $t \neq s$, and an OLS estimation would be consistent but not efficient. In this case, a generalized least square (GLS) estimation is both consistent and efficient, and is known as the random effects estimator. The usual technique to test whether the individual effects are correlated or not with $x_{it}$ is to use the test proposed
by Hausman [1978], which is based on the direct comparison of the intra-group and random effects estimators. Hausman tests are included in the results section. The tests find significant differences in coefficients estimated according to whether fixed or random effect approaches are used. All models are therefore estimated assuming fixed effects.

To estimate the regression model it is also important to bear in mind the great disparity between the data of each country in the period analysed, despite the normalisation introduced by normalising the variables by GDP. Because of this, in each model, the modified Wald statistic tests for groupwise heteroskedasticity in the residuals. The form of this statistic is given by the following expression:

\[ W = \sum_{i=1}^{N_g} (\hat{\sigma}_i^2 - \hat{\sigma}^2)^2 V_i - 1 \]  

(20)

where

\[ V_i = T_i^{-1} (T_i - 1)^{-1} \sum_{t=1}^{T_i} (e_{it}^2 - \hat{\sigma}_i^2)^2 \]  

(21)

and

\[ \hat{\sigma}_i^2 = T_i^{-1} \sum_{t=1}^{T_i} e_{it}^2 \]  

(22)

where \( N_g \) is the number of individuals (countries) and \( T_i \) the number of time observations of the \( i \)-individual. This statistic is still valid even when the hypothesis of normality is violated. Modified Wald statistics are included in the results section. No model shows any signs of heteroskedasticity.

4.5 Results and Discussion

I evaluate the models econometrically with a panel dataset of 15 developed markets and 6 emerging Asian private equity markets from 2000
until 2011. In order to examine the differences with regard to the stage of investments, I further differentiate between venture capital and buyout transactions.

### 4.5.1 Overall Private Equity Fundraising

Table 4.12 shows results for overall private equity fundraising (including venture capital (VC) at all stages, leveraged buyouts (LBOs), generalist private equity investing at all stages, fund of funds (FoF), secondary funds, as well as funds focused on turnaround, distressed, and special situations) for the panel dataset of developed private equity markets. The major determinants of funds raised are the amount of credit provided by the banking sector as well as exit opportunities in the form of IPOs. Coefficients for both variables are positive and statistically significant across all four models. This result is expected and lends support to the hypothesis that the availability of external financing by banks as well as the opportunity to exit deals by means of an initial public offering (IPO) are important conditions for an active private equity market as IPOs offer attractive exit opportunities and the availability of external financing financially leverages the returns. Research and development expenditures also seem to play a vital role as model III exemplifies. The market capitalization of listed companies does not seem to be statistically significant related to fundraising. Also the investment deal flow is not statistically significant. With regard to model IV, which includes further criteria related to the environment to do business, none of the additional variables is statistically significant. These results however are not surprising as developed markets all show high and long established standards with regard to these criteria. In this light, I would expect these criteria to be more of an issue with emerging markets and for early stage investments.

Results for emerging markets in Table 4.13 indeed show that both the time required to start a new business as well as costs related to start-
### Table 4.12: Private Equity Fundraising Overall, Developed Markets

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Model I</th>
<th>Model II</th>
<th>Model III</th>
<th>Model IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market capitalisation of listed companies</td>
<td>-1.079 (1.356)</td>
<td>-0.800 (1.395)</td>
<td>-0.720 (1.395)</td>
<td>-0.754 (1.409)</td>
</tr>
<tr>
<td>Credit provided by the banking sector</td>
<td>3.938 (2.135)</td>
<td>3.433 (2.217)</td>
<td>3.469 (2.214)</td>
<td>3.647 (2.306)</td>
</tr>
<tr>
<td>Investment deal flow</td>
<td>0.129 (0.743)</td>
<td>0.149 (0.744)</td>
<td>-0.005 (0.754)</td>
<td>-0.075 (0.796)</td>
</tr>
<tr>
<td>Exit opportunities via IPOs</td>
<td>119.401 (27.578)</td>
<td>125.725 (28.573)</td>
<td>125.232 (28.533)</td>
<td>129.178 (28.958)</td>
</tr>
<tr>
<td>GDP growth</td>
<td>-15.000 (17.523)</td>
<td>-12.165 (17.651)</td>
<td>-13.417 (17.849)</td>
<td></td>
</tr>
<tr>
<td>R&amp;D expenditures</td>
<td>273.751 (225.091)</td>
<td>216.02 (243.40)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strength of legal rights</td>
<td></td>
<td>-0.217 (0.799)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time required to start a business</td>
<td></td>
<td>0.017 (0.037)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost to start a business</td>
<td></td>
<td>-28.494 (29.839)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time trend</td>
<td>-0.298 (0.148)</td>
<td>-0.298 (0.148)</td>
<td>-0.376 (0.161)</td>
<td>-0.400 (0.186)</td>
</tr>
<tr>
<td>Constant</td>
<td>1.911 (3.089)</td>
<td>2.572 (3.186)</td>
<td>-3.781 (6.116)</td>
<td>0.262 (10.017)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.162</td>
<td>0.166</td>
<td>0.174</td>
<td>0.180</td>
</tr>
<tr>
<td>p-value of Hausman statistic</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>p-value of Wald modified statistic</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**Notes:** Fixed effects panel regression results of 15 developed private equity markets from 2000 to 2011. Countries include the United States (U.S.), the United Kingdom (U.K.), Canada, Israel, Japan, Australia, Germany, France, Spain, Italy, Sweden, Norway, Finland, Austria and Switzerland. Robust standard errors in parentheses.

- $a$ Significant at 1% level
- $b$ Significant at 5% level
- $c$ Significant at 10% level
ing a business are statistically significant. What further captures the eye is the different behavior in emerging markets with regard to the market capitalization of listed companies. While developed markets have shown statistically insignificant coefficients, in emerging markets that variable seems to play a crucial role. In all models, coefficients are positive and highly significant. This makes sense intuitively, as the market capitalization of listed companies is used as proxy for the development of the respective capital markets. Private equity transactions depend on a variety of financial intermediaries such as M&A intermediaries, lawyers, and other advisory services in order to execute transactions. The more developed a country’s capital markets, the easier it is for private equity firms to implement interesting transaction opportunities. Once the capital markets have reached a certain level however, other criteria become more important as the preeminent role of exit opportunities for developed markets demonstrates.

Surprising is the different behavior of emerging markets with regard to credit provided by the banking sector. All models show statistically significant negative coefficients on that front. This is an indication of different business models applied to private equity in emerging markets compared to developed markets. In emerging markets, private equity funding seems to stand in direct competition with banks for transactions. The more credit is provided by the banking sector, the less investment opportunities remain for private equity investments, thus resulting in negative coefficients. The statistically significant and positive coefficients on the investment deal flow (remember the insignificant coefficients for developed markets) support that hypothesis, underlining the importance of the recent deals that private equity could attract compared to banks financing the deals.
Table 4.13: Private Equity Fundraising Overall, Emerging Markets

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Aggregated annual fundraising (adjusted by GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model I</td>
</tr>
<tr>
<td>Market capitalisation of listed companies</td>
<td><strong>9.064 (3.202)</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Credit provided by the banking sector</td>
<td><strong>-13.798 (10.126)</strong>&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Investment deal flow</td>
<td><strong>9.081 (3.106)</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Exit opportunities via IPOs</td>
<td><strong>105.873 (31.324)</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>GDP growth</td>
<td><strong>-76.205 (49.358)</strong>&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>R&amp;D expenditures</td>
<td><strong>3.488 (3.539)</strong></td>
</tr>
<tr>
<td>Time trend</td>
<td><strong>0.842 (0.720)</strong></td>
</tr>
<tr>
<td>Constant</td>
<td><strong>-5.964 (9.208)</strong></td>
</tr>
<tr>
<td>$R^2$</td>
<td><strong>0.491</strong></td>
</tr>
<tr>
<td>p-value of Hausman statistic</td>
<td><strong>0.000</strong></td>
</tr>
<tr>
<td>p-value of Wald modified statistic</td>
<td><strong>0.000</strong></td>
</tr>
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Notes: Fixed effects panel regression results of 6 emerging private equity markets from 2000 to 2011. Countries include China, India, South Korea, Vietnam, Singapore and Hong Kong. Countries with marginal funds raised are not included in the analysis. Robust standard errors in parentheses.

<sup>a</sup> Significant at 1% level
<sup>b</sup> Significant at 5% level
<sup>c</sup> Significant at 10% level
4.5.2 Early Stage Private Equity Fundraising - VC

To take into account potential differences with regard to the stage of private equity investing, I further differentiate between venture capital and leveraged buyout transactions. Table 4.14 and Table 4.15 show results of the four models for venture capital funds raised in both developed and emerging countries. Compared to overall private equity fundraising, GDP growth and R&D expenditures become much more important criteria for both developed and emerging markets. This can be explained with the paramount importance of economic growth and research for the development of new business ideas. Newly created businesses thereby create investment opportunities for venture investments.

With regard to exit opportunities, as expected, coefficients and statistical significance on IPOs are reduced compared to overall private equity funds raised as VC depends on other exit channels than later stage private equity. Reduced coefficients and statistical significance can also be recorded for credit provided by the banking sector. This makes sense intuitively as venture capital transactions generally use less debt financing.

4.5.3 Later Stage Private Equity Fundraising - LBO

Results for leveraged buyout transactions in Table 4.16 and Table 4.17 show that with regard to the investment deal flow, both developed and emerging markets show decreased coefficients and levels of significance. Developed markets even exhibit statistically significant negative coefficients. One possible explanation could be that a large deal flow does also mean increased competition for attractive deals among private equity funds. Fundraising is therefore negatively related to new funds raised as the highly attractive deals are priced competitively and offer less potential with regard to outstanding returns. Further, cyclicality might play a role in that respect as well. Exit opportunities as measured by IPOs...
## Table 4.14: Private Equity Fundraising Venture Capital (VC), Developed Markets

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Aggregated annual fundraising (adjusted by GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model I</td>
</tr>
<tr>
<td>Market capitalisation of listed companies</td>
<td>-1.421 (0.605)$^a$</td>
</tr>
<tr>
<td>Credit provided by the banking sector</td>
<td>1.439 (0.953)$^c$</td>
</tr>
<tr>
<td>Investment deal flow</td>
<td>0.693 (0.332)$^b$</td>
</tr>
<tr>
<td>Exit opportunities via IPOs</td>
<td>35.975 (12.310)$^a$</td>
</tr>
<tr>
<td>GDP growth</td>
<td>5.243 (7.829)</td>
</tr>
<tr>
<td>R&amp;D expenditures</td>
<td></td>
</tr>
<tr>
<td>Strength of legal rights</td>
<td></td>
</tr>
<tr>
<td>Time required to start a business</td>
<td></td>
</tr>
<tr>
<td>Cost to start a business</td>
<td></td>
</tr>
<tr>
<td>Time trend</td>
<td>-0.277 (0.066)$^a$</td>
</tr>
<tr>
<td>Constant</td>
<td>1.440 (1.379)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.295</td>
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| p-value of Hausman statistic | 0.000 | 0.000 | 0.000 | 0.000 |
| p-value of Wald modified statistic | 0.000 | 0.000 | 0.000 | 0.000 |

Notes: Fixed effects panel regression results of 15 developed private equity markets from 2000 to 2011. Countries include the United States (U.S.), the United Kingdom (U.K.), Canada, Israel, Japan, Australia, Germany, France, Spain, Italy, Sweden, Norway, Finland, Austria and Switzerland. Robust standard errors in parentheses.

$^a$ Significant at 1% level

$^b$ Significant at 5% level

$^c$ Significant at 10% level
Table 4.15: Private Equity Fundraising Venture Capital (VC), Emerging Markets

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<td>Model I</td>
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<tr>
<td>Market capitalisation of listed companies</td>
<td>-0.219 (1.171)</td>
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<tr>
<td>Credit provided by the banking sector</td>
<td>-4.781 (3.703)</td>
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<td>Investment deal flow</td>
<td>3.957 (1.136)</td>
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<td>GDP growth</td>
<td>42.494 (17.569)</td>
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<tr>
<td>R&amp;D expenditures</td>
<td>343.357 (341.361)</td>
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<td>Strength of legal rights</td>
<td>1.473 (1.311)</td>
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<td>Cost to start a business</td>
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<tr>
<td>Time trend</td>
<td>0.187 (0.263)</td>
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<tr>
<td>Constant</td>
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<tr>
<td>$R^2$</td>
<td>0.234</td>
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<td>p-value of Hausman statistic</td>
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<td>p-value of Wald modified statistic</td>
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Notes: Fixed effects panel regression results of 6 emerging private equity markets from 2000 to 2011. Countries include China, India, South Korea, Vietnam, Singapore and Hong Kong. Countries with marginal funds raised are not included in the analysis. Robust standard errors in parentheses.

$^a$ Significant at 1% level

$^b$ Significant at 5% level

$^c$ Significant at 10% level
remain of crucial importance for both developed and emerging markets as expected.
Table 4.16: Private Equity Fundraising Leveraged Buyouts (LBO), Developed Markets

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Aggregated annual fundraising (adjusted by GDP)</th>
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</tr>
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<td>Market capitalisation of listed companies</td>
<td>-0.545 (0.905)</td>
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<tr>
<td>Credit provided by the banking sector</td>
<td>1.293 (1.426)</td>
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<td>Investment deal flow</td>
<td>-0.816 (0.496)c</td>
</tr>
<tr>
<td>Exit opportunities via IPOs</td>
<td>58.718 (18.411)a</td>
</tr>
<tr>
<td>GDP growth</td>
<td>-10.980 (11.693)</td>
</tr>
<tr>
<td>R&amp;D expenditures</td>
<td>-221.376 (149.872)c</td>
</tr>
<tr>
<td>Strength of legal rights</td>
<td>0.022 (0.024)</td>
</tr>
<tr>
<td>Time required to start a business</td>
<td>0.022 (0.024)</td>
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<tr>
<td>Cost to start a business</td>
<td>-13.904 (19.726)</td>
</tr>
<tr>
<td>Time trend</td>
<td>-0.048 (0.099)</td>
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<tr>
<td>Constant</td>
<td>1.779 (2.062)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.073</td>
</tr>
<tr>
<td>p-value of Hausman statistic</td>
<td>0.000</td>
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<td>p-value of Wald modified statistic</td>
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</tr>
</tbody>
</table>

Notes: Fixed effects panel regression results of 15 developed private equity markets from 2000 to 2011. Countries include the United States (U.S.), the United Kingdom (U.K.), Canada, Israel, Japan, Australia, Germany, France, Spain, Italy, Sweden, Norway, Finland, Austria and Switzerland. Robust standard errors in parentheses.

- Significant at 1% level
- Significant at 5% level
- Significant at 10% level
<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Aggregated annual fundraising (adjusted by GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model I</td>
</tr>
<tr>
<td>Market capitalisation of listed companies</td>
<td>8.476 (2.606)(^a)</td>
</tr>
<tr>
<td>Credit provided by the banking sector</td>
<td>-5.597 (8.244)</td>
</tr>
<tr>
<td>Investment deal flow</td>
<td>4.435 (2.528)(^b)</td>
</tr>
<tr>
<td>Exit opportunities via IPOs</td>
<td>65.774 (25.501)(^a)</td>
</tr>
<tr>
<td>GDP growth</td>
<td>-91.196 (39.244)(^a)</td>
</tr>
<tr>
<td>R&amp;D expenditures</td>
<td>4.457 (2.684)(^b)</td>
</tr>
<tr>
<td>Strength of legal rights</td>
<td>Time required to start a business</td>
</tr>
<tr>
<td>Cost to start a business</td>
<td>Time trend</td>
</tr>
<tr>
<td></td>
<td>Constant</td>
</tr>
<tr>
<td></td>
<td>(R^2)</td>
</tr>
<tr>
<td></td>
<td>p-value of Hausman statistic</td>
</tr>
<tr>
<td></td>
<td>p-value of Wald modified statistic</td>
</tr>
</tbody>
</table>

**Notes:** Fixed effects panel regression results of 6 emerging private equity markets from 2000 to 2011. Countries include China, India, South Korea, Vietnam, Singapore and Hong Kong. Countries with marginal funds raised are not included in the analysis. Robust standard errors in parentheses.

\(^a\) Significant at 1% level

\(^b\) Significant at 5% level

\(^c\) Significant at 10% level
4.6 Conclusion

Investments in private equity have grown tremendously over the last decade. The merits and the potential of the asset class seem undisputed. Emerging markets have started to discover the potential of private equity and have attracted significant capital. Asia dominates fundraising and investment in this respect, having attracted the majority of total emerging market capital raised over the last 10 years. Empirical studies on what determines fundraising in emerging markets are still limited. Both investors and policymakers need to understand what determines a flourishing industry and how they might approach private equity in emerging markets. The essay provides an empirical analysis of private equity across both developed and emerging markets and detects determinants as well as differences in the approach taken towards private equity.

Results show that exit opportunities and the amount of credit provided by the banking sector are strong determinants of overall private equity funds raised. Unlike in developed markets, emerging markets are negatively impacted by the amount of credit provided by the banking sector. Funding of transactions stands in direct competition with banks, explaining the negative relationship with credit provided by the banking sector. The more credit is provided by the banking sector, the less investment opportunities remain for private equity investors. This could also be an indication of different approaches taken with regard to private equity. In developed markets, banks leverage private equity transactions to a substantial degree to magnify returns of equity owners. In emerging markets, private equity transactions are using much less leverage as returns come from revenue growth and efficiency gains rather than financial engineering.

Differentiating along investment stages, economic growth and research and development (R&D) expenditures are found to be of particular importance to venture capital (VC). For later stage leveraged buyouts, the degree of recent deals negatively impacts funds raised. One explanation might be that as competition for attractive deals among private equity
funds intensifies, investor return expectations deteriorate and funding is adapted accordingly.

Overall, the results of the essay are surprising and confirm the importance and necessity of a deep and thorough understanding of the market before investors start to diversify towards emerging markets. Limitations of the research can be seen in the limited exploration of potential determinants specific to emerging markets that might play less of a role in developed markets. A deeper exploration of these factors could further strengthen the understanding of emerging market private equity and thereby facilitate international investors’ access to the potential of emerging market private equity.
Acknowledgements

I thank Standard & Poor’s, Thomson Reuters, Prequin, the International Monetary Fund, The World Bank and the UNESCO Institute for Statistics for their support with the extensive data collection for the study and access to data. Further, I would like to thank Josh Lerner, Jacob H. Schiff Professor of Investment Banking at Harvard Business School and Matthew Rhodes-Kropf, Associate Professor in the Entrepreneurial Management Unit at Harvard Business School, for their comments and discussions.

All errors and opinions are my own.
References


5 Conclusion

Despite the success of private equity, a lot of uncertainty still prevails with how to deal with the asset class: Professional investors still help themselves with simple rules of thumb rather than with substantiated methods when it comes to investing in private equity. The academic approach that has been taken in this thesis helps to reduce that uncertainty and improves investors’ investment approaches towards private equity, offering empirical evidence on (1) how to commit and recommit to private equity to achieve a specified asset allocation, (2) on whether past performance can be seen as an indication of future performance (and therefore be used for selecting the best performing funds in prior periods) and (3) with shedding light on the differences between the approach taken towards private equity in emerging markets compared to developed markets.

With regard on how to recommit to private equity funds to achieve a specified asset allocation, I have developed a dynamic recommitment strategy for a private equity allocation in a portfolio context. The approach serves investors with a private equity allocation to manage capital recommitments to private equity funds and achieve their desired allocation to the asset class. Suggested recommitments are composed of 1) distributions and 2) commitments that are not expected to be called any longer, both weighted by the inverse of the actual investment degree, and 3) the amount necessary to rebalance the asset classes to the strategic policy portfolio. A minimal annual recommitment of 15% of the total private equity part of the portfolio ensures vintage year diversity and continuing access to the best GPs. Historical simulations show that investment degrees in the range of 0.7 to 0.8 are attained using that recommitment strategy, i.e. between 70% and 80% of total capital allocated to private equity would actually also be invested. Introducing additional overcommitment increases the investment degree at the risk of not being able to come up for capital calls. An additional overcommitment of 50% leads
to an investment degree of around 0.9 from the mid 2000’s onwards and increases the overall investment degree for a portfolio initiated in 1983 from 0.73 to 0.89. While such overcommitment behavior might make sense for an institutional investor with a portfolio of other liquid asset classes that could temporarily cover the private equity capital calls, that decision has to be taken with regard to the needs and circumstances of investors on an individual basis.

Limitations of the approach can be seen in the highly cyclical behavior of the recommitment strategy: The typical "boom and bust cycles" distract from a more balanced investment degree. Further research is therefore encouraged in the field of anti-cyclical commitment behavior that anticipates oversized "cyclical" recommitments and could provide investors with a more equalized investment degree. Further limitations and room for research lie in the assumptions: A very important issue is related to the ability to invest in the best performing funds. The spread observed between good and bad performers is significantly higher in the private equity asset class than for quoted stocks or bonds. In other words, aggregate figures might not give a true picture of the dispersion of performances, offering a direction of promising research.

With regard to that ability to invest in the best performing funds, institutional investors still pay a lot of attention to the "top quartile label" proudly promoted by a continuously growing number of GPs when deciding on their private equity fund investments. The second essay examines whether past top-quarter performance can indeed be seen as an indication of future outperformance and whether such an approach can be implemented in practice? Empirical evidence on private equity return persistence shows mixed results. While the first academic studies show statistically significant return persistence for both venture capital and buyout funds, later studies show mixed evidence on return persistence for buyout funds after the year 2000. As funds with strong performance tend to attract investors and grow in size, performance does not appear
to be scalable, a sign of diseconomies of scale in managing private equity funds. Reasons can be seen in the difficulty that firms have holding on to talent. Once they reach a certain point in their career, successful GPs often leave to set up a business on their own. These spin-out groups then go on to compete with their progenitors for deals, which can result in a less more efficient, more mature market for deals and higher prices. Partners at highly successful firms might also become less eager to take the risks to get an outstanding return. A refinement of areas of expertise and personnel additions/changes coupled with changing market dynamics can further alter the strategy pursued by the GP and the environment in which the funds will invest.

Even if persistence is still there to a certain degree, especially for venture capital funds, implementing a strategy to invest in fund managers with an extended track record of superior returns is not easily implemented. First, due to ambiguous performance criteria, there is some leeway to define top quartile performance why much more than a quarter of funds claim to be classified as top quartile. Further, a fund moves between quartiles over the course of its life. A fund claiming top quartile may be referring to a point in time rather than to a persistent rating. Second, private equity groups often raise subsequent funds before the previous funds’ performance can be accurately measured. This means that for investors to act on top quartile correlation between predecessor and following funds, they would need to know what the final performance of a fund is after only a few years of operation, i.e. typically when the fund is still the investment phase. Today, for example, we may observe that good vintage-1995 funds tended to be followed by good vintage-1997 funds. But exploiting this for investment purposes required knowing in 1997 which of the vintage-1995 funds were good. Interim performance is a noisy signal of eventual performance, which is itself a noisy signal of future performance. This compounds the challenge of identifying top private equity managers.

Even as empirical evidence shows that past performance can help
to some degree identify top quartile managers, it still can’t identify what makes the top-ranking managers outperform. The best approach is to talk to GPs, co-investors and the CEOs of the portfolio companies themselves. Due diligence surveys of the investment strategy and philosophy of the team add further depth, beyond what is found in the private placement memorandum (PPM) and other marketing materials. Direct meetings with other GPs and back-office personnel show areas of expertise, as well as limitations within the team and the overall dynamic within the firm. Lastly, reference checks should be made to current and past limited partners, prior members of the firm, CEOs of portfolio companies, lenders, consultants, etc., providing further verification of the firm’s ability or outlining additional areas of concern. In the end, a holistic due diligence process might offer the best insights on the factors that in the end determine success and failure of managers and give investors in the asset class the best indication to find a top quartile manager. The essay took the first step and recommends a thorough due diligence process instead of relying on past top quartile performance. Further research is encouraged to better understand the success factors of GPs and which characteristics to consider during a GP due diligence.

Investors not only try to invest in the best performing funds, they also try to diversify their investments geographically. As investors are increasingly interested in emerging markets private equity, the third essay examines the determinants of private equity market activity and shows the differences of drivers in Asia as by far the largest emerging market compared to developed markets. While socio-economic drivers for private equity in the developed world are quite similar across countries, developed markets show significant differences. Results show that exit opportunities and the amount of credit provided by the banking sector are strong determinants of overall private equity funds raised. Unlike in developed markets, emerging markets are negatively impacted by the amount of credit provided by the banking sector. Funding of
transactions stands in direct competition with banks, explaining the negative relationship with credit provided by the banking sector. The more credit is provided by the banking sector, the less investment opportunities remain for private equity investors. This is an indication of different approaches taken with regard to private equity: In developed markets, banks leverage private equity transactions to a substantial degree to magnify returns for equity owners. In emerging markets, private equity transactions are using much less leverage as returns come from revenue growth and efficiency gains rather than financial engineering. Differentiating along investment stages, economic growth and research and development (R&D) expenditures are found to be of particular importance to venture capital (VC). For later stage leveraged buyouts, the degree of recent deals negatively impacts funds raised. One explanation might be that as competition for attractive deals among private equity funds intensifies, investor return expectations deteriorate and funding is adapted accordingly.

To sum up, the thesis helps to reduce the prevailing uncertainty among professional investors in private equity and improves investors’ investment approaches towards the asset class. With regard to the question of how much to commit to private equity in order to achieve a certain asset allocation, a dynamic recommitment strategy is developed that works in a portfolio context. Addressing the question of which funds to select in the first place, the prevailing approach to invest in the funds that showed the best performance in the past is challenged: Instead of past top quartile performance, a holistic due diligence process is advised to find future top quartile GPs. Looking at current attempts of international diversification, differences of developed markets in the approach taken towards private equity compared to Asia as the largest emerging market are carved out.

Providing answers to these burning questions and encouraging further
follow-on research, the thesis contributes to the ongoing professionalization of investing in private equity, a highly promising, still young but increasingly asset class.
Acknowledgements

I would like to thank Prof. Dr. Andreas Grüner and Prof. Dr. Li Choy Chong for their helpful comments and support during the process of that PhD thesis. Further, I am grateful for the inspiring discussions with and suggestions of Matthew Rhodes-Kropf, Associate Professor at the Entrepreneurial Management Unit at Harvard Business School ("HBS") and Josh Lerner, Chair of the Entrepreneurial Management Unit and Jacob H. Schiff Professor of Investment Banking at HBS during my time at Harvard as research fellow. All errors and opinions are my own.
References


About the Author

Adrian Oberli, CFA, FRM, founded and works for Oberli Beteiligungen AG. The company acts as an active investor in Swiss small cap companies. Before having founded his own company, Adrian was working in the field of private equity, alternative investments and M&A with various companies in London, Munich, Zurich and Basel.

Date and place of birth

5 April 1982 Basel-Stadt, Switzerland

Education and degrees

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<td>FRM, Financial Risk Manager</td>
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Work experience

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