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Do Zombie Funds Underperform other PE Funds?

An empirical study of the Nordic private equity market

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Abstract

This thesis investigates the scope, magnitude and performance of zombie funds in the Nordic private equity market. Our sample comprises of a total 266 funds from the 5 different Nordic countries. The vintage years of our sample funds are from 1998 to 2007, in order to grasp the two major economic downturns since the turn of the millennia. We cross-examine our sample with funds that have a vintage between 2008 until today, in order to identify potential zombie funds. Given this analysis, we find that the zombie funds constitute a substantial proportion of the total Nordic PE market. We are also able to distinguish the performance between 'normal' and zombie funds. Due to the absence of adequate interim performance measurements, this thesis applies different exits as an indication of success. We find that zombie funds are less likely to exit their portfolio companies compared to normal funds. This is true across all PE-backed exit types in our analysis. We also find that zombie funds are more likely to occur for smaller funds.

Preface

This thesis represents the end of a long and exciting period of research, and the end of a five-year study of economics. Throughout the process, we have attained valuable knowledge about the private equity industry and gained new insight on how to conduct robust empirical research. The process has been challenging and time-consuming, yet very rewarding.

There are several people, from whom we have received invaluable advice and assistance during this process. First, we would like to thank our supervisor, Associate Professor Tyler Hull. We truly appreciate your constructive and precise feedback throughout the thesis. Furthermore, we would like to thank Associate Professor Carsten Bienz for providing us with data on the Nordic private equity market, and for helping us with the fundraising related to the Preqin database. We would also like to thank Senior Investment Director at Argentum Private Equity, Espen Langeland, for sharing his industry knowledge with us.

Table of Contents

1. Introduction

A 2013 article in The Economist sheds light on the dark shadows of the private equity industry, where conflicts of interest create situations in which there are no winners[1]. A special sub-category of funds roam these shadows, characterized by a wobbly walk towards an endless lifespan – here reigns the living dead. With an extended life, from which there is no comfortable escape, these funds are likely to return less than what was initially committed by the investors. The prospects of profits for the fund managers are equally grim, and their incentive to keep these funds alive is quite simply to collect management fees. Because of private equity's remarkable barriers to exit, investors seem to suffer the biggest loss, but the fund managers also suffer great reputational damage, which makes it difficult to raise subsequent follow-on funds. Thus, in general, these funds are destroying value and inflicting trouble upon institutional investors, fund managers and portfolio companies alike. These frightening funds are undoubtedly undesirable for all the parties involved, and according to recent news articles and industry research, they are growing in numbers. Consequently, both the industry and the authorities has become acutely aware that there are zombies at the gates.

This subclass of private equity funds goes by many names, such as "disrupted cycle funds" or "tail-end funds", but the term that has been adopted by the majority is "zombie funds". There is limited empirical research on zombie funds, but recent interviews conducted by players in the industry show increased awareness related to zombie fund problems among institutional investors. In the summer of 2013, Preqin revealed that as much as 116 billion USD could be trapped in zombie funds globally, which surely has attracted interest from the authorities. Since then, both financial authorities in the U.K. and the U.S Securities and Exchange Commission have launched investigations of zombie funds[2]. However, despite increased awareness and rapid global growth in zombie funds, the private equity industry has thus far failed to find a long-lasting cure. Since the turn of the millennia, the world economy has been through two major economic downturns that have served as a fertilizer for zombie funds in both Europe and the U.S. A period with significant write-offs, followed by the credit crunch a few years later, has led to a sharp increase in zombie funds. Investors in need of liquidity and new post-Lehman Brothers capital adequacy rules for banks and insurance companies mean that many investors have increasingly pressured portfolios. This has

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[1] The Economist "Zombies at the Gates" (March 2013)
[2] Reuters *"More than $100 billion trapped in 'zombie funds:' industry data"* (June, 2013). & The Guardian: *" FCA inquiry into 'zombie funds' hits industry but may help millions of savers"* (March, 2014)

amplified the ramifications of zombie funds and made an already sensitive industry even more prone to zombie fund situations.

The majority of reports on zombie funds that provide descriptive statistics typically focus on the U.S. or Europe. This thesis focuses on zombie funds in the Nordic region. Specifically, we want to test if there is any significant empirical evidence that zombie funds are less likely to exit their portfolio companies compared other normal PE funds raised by Nordic GPs. Due to the absence of adequate interim performance ratios, we apply different exit types as a measurement of success for a PE fund in this thesis.

Following the literature review in chapter 2, chapter 3 provides a conceptual clarification of the private equity fund structure. This chapter will elucidate the structural elements, which at least partly, facilitate the emergence of zombie funds. As academic research on zombie funds is limited at the time of writing, chapter 4 will provide a definition of zombie funds and an assessment on the mechanism of these funds. Chapter 5 covers data, sample selection and empirical methodology, while chapter 6 covers the empirical analysis. The empirical analysis uses a multivariate regression framework to test wheter zombie funds are less likely to exit their portfolio companies compared to normal PE funds. Finally, chapter 7 concludes the thesis.

2. Related Literature

Zombie funds have indeed emerged as a widely conversed issue in the private equity industry and amongst private equity investors. However, the term "zombie fund" rarely features in the literature and empirical studies explicitly focusing on the zombie fund situation are scarce at best. In their paper on private equity performance, Phalippou and Gottschalg (2007) find that half of their sample funds report positive final net asset values (NAVs) despite the fact that the funds have reached their usual or maximum liquidation age and appear to be inactive. The paper states that the NAVs reported by these funds are likely to be worthless and thus represent "living dead" investments. Furthermore, Phalippou and Gottschalg conclude that these residual values ought to be written off, thus reducing private equity returns by 7 percent. This write-off resulted in a negative 3.5 percent private equity underperformance compared to public equity. Robinson and Sensoy (2012) looked at fee structure as a potential cause for GPs to delay liquidation of poor-performing funds. The paper suggests that funds with a change in fee basis from committed capital to net invested capital at some point during the fund's life, tend to have LP distributions occurring later in the fund's life compared to funds without such management fee provision. The idea that zombie fund managers struggle to raise follow-on funds is supported by the findings of Kaplan and Schoar (2005), which show that relatively poor performing funds are less likely raise a follow-on fund. Because returns in private equity take some time to realize, their paper suggest that when GPs raise the first follow-on fund, investors may not have learned completely about the true performance of the previous fund. This could indicate that zombie fund managers are able to raise a follow-on fund, but that the second follow-on fund is more difficult to raise.

As mentioned in the introduction, a report from Preqin revealed that approximately 1,200 private equity funds with an accumulated $116 billion worth of private equity assets, exhibits properties consistent with those of zombie funds[3]. Furthermore, Preqin's figures show that median distributions to paid-in capital are much lower for zombie funds compared to their peers, indicating that these are relatively poor performing funds. The majority of zombie funds are venture capital funds, but as much as $40 billion worth of net asset values are also trapped in buyout funds[4]. Although zombie funds appear to be absent in the literature, the private equity industry and its investors appear to be well aware of the situation. In a

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[3] Preqin, *Private Equity Spotlight (*June 2013).
[4] Preqin, *Private Equity Spotlight* (September 2013).

survey conducted by leading investor in the private equity secondary market, Coller Capital, 57 percent of limited partners claim they have zombie funds in their portfolio and only 6 percent believe they have predictable remedies to zombie fund situations in most cases[5].

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[5] Coller Capital, *Global Private Equity Barometer* (Winter 2011-2012*)*.

3. Private Equity Funds

In contrast to investors in the public equity market, investors in the private equity market typically acquire interests in private equity investment funds rather than making direct investments in privately held companies. Although collective investment vehicles also exist in the public equity market, private equity investment funds differ significantly from both mutual funds and hedge funds, and possess certain characteristics that make these investment vehicles pre-eminently susceptible to zombie fund situations. Thus, a fundamental understanding of the structure of private equity funds is required in order to get a comprehensive grasp on why zombie fund situations arise in the private equity market.

In generic terms, an investment fund is a joint investment scheme that uses a pool of capital from several investors to purchase financial securities collectively. Hence, the investment funds increase the investors' financial ability to acquire securities. Holding an ownership stake in an investment fund yields the right to the underlying assets and associated income, but the investors are not involved in the everyday management of the fund, as each investment fund typically has a fund manager. Therefore, in addition to achieving greater purchasing power in the marketplace, the investors can capitalize on the expertise of a qualified asset manager. Investment banks and other asset managers, raise both investment funds aimed at retail investors such as mutual funds and exchange-traded funds (ETFs), and funds aimed at professional and institutional investors such as hedge funds. Consequently, the investment strategy of a specific investment fund can range from a low-cost fund tracking a broad stock market index like the S&P 500, to a fund with extensive use of financial leverage and derivative contracts.

In the private equity market, private equity firms such as The Blackstone Group and The Carlyle Group raise investment funds in order to acquire multiple privately held companies, commonly referred to as portfolio companies. Private equity funds can also invest in publicly traded companies, with the intention of delisting the companies, i.e. turning them private. The principal property that sets private equity funds apart from mutual funds and hedge funds is the application of an active ownership structure to the portfolio companies. Through financial and operational improvements, private equity funds aim to enhance firm value, before eventually realizing profits through an IPO or by other means[6]. In fact, IPOs are a relatively small fraction of global private equity-backed exits, where the most common exit

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[6] Føllesdal, S. & Hagen, E.N. *Private Equity-Backed Firms' Performance Post IPO* (2013). Norwegian School of Economics

routes are trade sales and secondary buyouts (SBOs)[7]. Private equity funds typically target professional and institutional investors such as insurance companies and pension funds, but also high net-worth individuals. The term "private equity fund" can be thought of as an umbrella term, beneath which we find investment funds with different strategies like venture capital funds (VC) and leveraged buyout funds (LBO). In addition to private equity funds that acquire portfolio companies, some funds known as fund-of-funds (FOF) purchase fund interests in other private equity funds rather than making direct investments in the underlying companies. Yet, despite numerous variations in investment strategy, the fund structure of most private equity funds tends to be analogous. Consequently, the following sections will examine the terms and structure of a generic private equity fund, henceforth abbreviated PE fund (Figure A).

3.1 Fund Structure

In terms of legal structure, a PE fund is typically set up as a limited partnership, in which the private equity firm serves as the general partner (GP) and several institutional investors serve as limited partners (LPs). Some PE funds are also organized as limited liability companies (LLCs), but dissimilarities in legal structure among PE funds primarily relate to tax considerations and regulatory issues[8]. PE funds exhibit certain properties that separate them from mutual funds and hedge funds. Firstly, GPs normally raise a fixed amount of capital, of which 1-5% is committed by the GP itself[9]. This means that the PE fund manager invest alongside the investors in the fund. The investors become LPs in the fund by subscribing for a capital commitment[8]. The capital commitments are not funded at inception, but rather through capital calls at the GP's discretion. Thus, there is often a discrepancy between committed and invested capital at the fund's disposal known as "dry powder". Secondly, PE funds are limited duration investment vehicles, usually with a fixed 10-year lifespan, but with the option of annual or two-year extensions[10]. Finally, PE funds are closed-end investment vehicles where a legally binding contract determines a limited period (typically 12-18 months), during which the fund can accept capital commitments. Therefore, beyond that specific period, new investors cannot buy into the fund and existing investors can neither add to their fund interest nor redeem their commitments[8]. The legal aspects related to the partnership are governed by the limited partnership agreement (LPA), which despite its

[7] "Preqin Private Equity Spotlight"(July 2014). Preqin
[8] Naidech, S.W., Chadbourne & Parke LLP. *Private Equity Fund Formation* (2011). Practical Law Company.
[9] Gilligan, J. & Wright, M. *Private Equity Demystified* – An Explanatory Guide. Second Edition (2010).
[10] *"Investor Hazzard: 'Zombie Funds'"* (2012). Wall Street Journal

name is a contractual obligation that binds both the GP and LPs. The LPA covers commercial issues like investment profile, profit sharing and fee structure, but also constitutional and administrative issues, e.g. when the fund manager can raise a new fund.

The fund's capital is invested during the first 3-5 years, after which the GP aims to raise a follow-up fund. Therefore, GPs often have more than one fund under management, and the success of the current fund is key to raising the next one. During the later years of the fund's life, the investments are gradually exited and proceeds are usually distributed to LPs rather than being reinvested in the fund. Ultimately, as the fund approaches the end of the term, the fund is liquidated and any remaining proceeds are distributed to investors. Thus, the nature of private equity investments implies negative returns and cash flows in the early years, and investment gains and positive cash flows in later years[11]. This tendency is often referred to as the private equity J-curve. So, the LPs subscribe to a long-term illiquid capital commitment, from which they rely on the sale of the whole portfolio company to achieve a capital gain[9], and from which they rely on the liquidation of the fund to get the commitment redeemed in full.

3.2 Compensation Structure

The prevailing fee structure in private equity is commonly referred to as the 2/20 rule, in which the GP receives 2 percent annual management fee and 20 percent carried interest. Therefore, the GP is essentially compensated in two ways; Firstly, the GP receives an annual management fee equivalent to 1-3 percent of the initial capital commited to the fund[12]. The management fee is applicable for the duration of the fund. However, as presented by Metrick and Yasuda (2007) in their paper on the economics of PE funds, a significant fraction of PE funds change the fee basis from committed capital to net invested capital after the completion of the investment period. Morover, about 50% of PE funds make adjustments to the post-investment period fee level compared to the initial fee level, and some funds change both the fee basis and fee level. The management fee is intended to compensate the GP for operating the partnership and to cover the fund's costs and expenses[13].

Secondly, a substantial fraction of the GP's compensation is tied directly to the performance of the fund[14]. This performance fee is known as carried interest or simply as

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[11] Diller, C. Herger, I. & Wulff, M. *The Private Equity J-Curve: Cash Flow Considerations from Primary and Secondary Points of View.* Capital Dynamics.
[12] Prowse, S.D. *The Economics of the Private Equity Market* (1998). Federal Reserve Bank of Dallas Economic Review.
[13] British Private Equity & Venture Capital Association (BVCA), *Limited Partnership Agreement – Explanatory Notes* (2002).
[14] Moon, J.J. *Public vs. Private Equity* (2006). Journal of Applied Corporate Finance, Volume 18 Number 3.

"carry", and is intended to reward the GP for enhancing performance. The carry is set as a fixed percentage (typically 20 percent) of profits that exceed comitted or invested capital. Generally, the carry is also conditional upon delivery of profits that exceed a specified hurdle rate or preferred return, which is measured as the funds internal rate of return (IRR). Some funds make carried interest payments annualy or at the end of the fund's life, but the majority make payments at the sale of the investment, i.e. when the carried interest is generated[15]. Thus, It is common to see carry on a deal-by-deal basis, but also on a "whole fund" basis. According to Sahlman (1990), the carried interest may be several times larger than the management fees for a fund with average returns, which could lead to excessive risktaking from the GP in order to maximimize the carried interest. Other fees such as deal and monitor fees may also apply.

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[15] Preqin, *the 2015 Preqin Private Equity Compensation and Employment Review.*

4. Zombie Funds

4.1 Definition

Even though zombie funds have emerged from the shadows and created a lot of fuss in the private equity market, the term remains somewhat colloquial, and lacks a precise definition. Some even refuse to use to the term because of its pejorative nature, and one can argue that the perception of GPs on the matter differ greatly from that of the investors[16]. However, the two most important aspects to take into account is the fund's duration and the GP's ability to raise a subsequent follow-on fund. GPs aim to raise a new fund at the end of the investment period, which usually occurs 3-5 years after the commencement of the fund. In terms of duration, PE funds are limited duration funds with a fixed lifespan of 10 years plus a one or two-year extension. With regard to the categorization, one can apply strict or lenient conditions that must be satisfied in order for a PE fund to be categorized as a zombie fund.

We apply a definition in which a fund can be categorized as a potential zombie fund if the fund manager has failed to raise a follow-on fund after 7 years. This definition conforms to the definition applied by Preqin when they identify zombie funds in their database[17]. Our analysis includes pre 2002 vintages, which means that a part of the sample selection also will conform to the strict definition of a zombie funds. A thorough elaboration of the identification of zombie funds in the Nordics is covered in chapter 5.

4.2 Mechanisms

Among different underlying dynamics, ranging from the industry's lack of transparency to the fee structure in limited partnerships, underperformance sticks out as the major underlying factor[18]. The GP's incentive to keep an underperforming fund artificially alive at the expense of the LPs represents a misalignment of interests. As carried interest is off the table in a zombie fund, a term extension, which implies continued management – or rather lack of management – is the most lucrative option for the fund's GP. If the GP think it is too early to liquidate the remaining assets and want to extend the fund's life with a year in order to maximize the fund's value, he is often in a position to do so according to the fund's

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[16] "NewGlobe Capital Wants to Help 'Disrupted Cycle' Funds" (August 2013). Reuters PE Hub
[17] "Preqin Private Equity Spotlight" (June 2013). Preqin
[18] Many of the following issues are discussed in Migliorini (2014), who have conducted several interviews with LPs in order to uncover some of the underlying mechanisms of zombie funds.

terms[19]. In addition to charging management fees, GPs may also charge their own "consulting fee" in order to squeeze as much money out of the fund as possible. After the LPs have subscribed for a capital commitment, they have limited control over the investments made by the fund. The GP decides which portfolio companies to invest in, and when to exit the investments. When the fund's maturity date is imminent, the future action may raise an internal conflict of interests between the LPs as well. Some investors may prefer immediate liquidity and are willing to record a loss when they think the fund is doomed, while other investors might prefer to hold on to the investment in hope for a brighter future.

It would also be a reputational matter to keep a zombie fund alive. A GP's business is strictly dependent on investor's capital, and the willingness to reinvest their money in a successor fund. However, the LPs are mainly concerned about obtaining a good return on their committed capital, and are thus more attracted to choose a fund manager with a good track record. A GP that chooses to liquidate its zombie fund, e.g. with a fire sale, would in almost all cases have to disclose a bad performing fund on its record. This may appear as unappealing for future investors, which ultimately make them prefer a fund manager with better scores. Finally, the closing process can also provide some explanation as to why GPs rather want to keep a zombie fund alive[20]. In the U.K., there have been legislative changes that make it more expensive to close down a fund, which makes it easier for GPs economically justifiable to keep the fund alive, even when the performance is poor. There is no universal consensus to explain the mechanisms of keeping a zombie fund alive, even in a fund, which future prospects are poor.

Several other contributing factors can lead to zombie fund situations. Funds that distribute a return below its benchmark need to convince the investors why they should sign up for a capital commitment in the follow-on fund. If the current fund underperforms, investors may opt to invest with a different GP. Another reason for not being able to raise a follow-on fund may be that LPs have lost faith in the fund manager. This issue is closely related to underperformance, but the loss in faith can also be tied to changes in the GP's behavior, e.g. changes in the fund's succession plan or to the risk profile. These changes may cause uncertainty and disbelief among the investors, and make them more reluctant to participate in a follow-on fund. A change in the investment team may also make the LPs

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[19] Belsley, M. & Charles, I.H. *"Phoenix rising – restructuring as a solution for zombie funds"* (2013). Financier Worldwide
[20] *"Why is it so difficult to close down zombie funds?"* (2014). Fundweb

more hesitant to invest in a follow-on fund, as the effectiveness of the initial investment team, whit whom they trusted their capital, can be adversely affected by such changes.

5. Data, Sample Selection and Empirical Methodology

5.1 Sample Selection

The data is collected from Preqin's database of PE funds in market, Fund managers and the performance analysis of the respective funds. The following fund types are excluded from our potential Zombie Fund's analysis: Fund of funds, secondaries, distressed debt and co-investments. This is due to the nature of these funds, which will not meet our zombie fund's definition criteria. The data is also restricted to only include Nordic funds. By this we mean funds where the GP's headquarter is located in the Nordics. There are, however, no restrictions on the geographical investment focus for the corresponding funds. In addition to Preqin's sample, we have also collected data from Argentum and SDC Thomson, in order to identify the number of exits and exit types for each fund. We have manually crosschecked these samples in order to identify the different exits nies in each fund.

In order to identify potential zombie funds, the sample is based on one database that include Nordic funds with vintage year from 1998 to 2007, and another database that consists of Nordic funds with vintage from 2008 to 2014. The rationale for having a vintage year from 1998 to 2007 is to cover both the dot-com bubble and the financial crisis, where we believe to find a higher concentration of zombie funds, consistent with our hypothesis. By cross-referencing these databases, we are interested in finding GPs that only appears with funds from 1998 to 2007, and where the respective GP has not made any follow-up funds in the latter years. The sample is also controlled for GPs that are no longer active and has shut down its business. Funds that are liquidated are also excluded from our sample.

One of the biggest challenges in our sample is to find appropriate performance measurements that are applicable to the analysis. PE firms are not required to disclose performance data on its funds, which may create a bias in our sample[21]. Naturally, PE firms have incentives to disclose data on well-performing funds in order to attract potential investors. Conversely, PE firms would be more reluctant to unveil the same performance measurements on weak-performing funds. Thus, we use different exit types as a measure for a successful funds (e.g. IPO or trade sale), to prevent a violation of the random sampling assumption in the regression analysis.

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[21] Harris, R.S. Jenkinson, T. & Kaplan S.N. "Private Equity Performance: What Do We Know?"(2013). Journal of Finance

Data regarding fund size, fund type and industry focus are all disclosed in our sample of potential zombie funds, and should not create the same possibility for biasedness.

5.2 Variable Description

The analysis variable *Vintage* gives us the year in which the fund was raised. The vintage year can differ from the fundraising launch date, but the vintage year should provide a more realistic picture of the fund's age. This is a crucial variable in identifying zombie funds in our dataset, due to the fact that we are interested in funds that have exceeded a certain age.

The next analysis variable, *potzf,* is a dummy variable that equals 1 when the fund meets our predetermined criteria for a potential zombie fund. This dummy variable is zero when the criteria are not met.

The *gploc* variable tells us where the fund manager (GP) is headquartered. Only GPs with headquarters in the Nordics are included. To control for country specific effects, we have constructed a dummy variable (e.g. gploc1 for Denmark) for each country.

The analysis variable, *zfexit*, is a dummy that equals one when a Potential Zombie Fund has completed an exit, and zero elsewhere. The *normalexit* variable is a dummy that equals 1 when a 'Normal' Fund has completed an exit and zero elsewhere.

We split the exit types into 6 categories and distinguish between the following exit types: *IPO*, *MBO*, *Trade Sale*, *Secondary*, *Other* and *No Exits*. We have counted each fund's exits thoroughly, and made a dummy variable for each exit type, that equals 1 if the fund has the completed that particular exit type, and zero elsewhere. Other exits refer to unknown or special exit routes that could not be placed under one of the other categories. This could for example be restructurings or leveraged recapitalizations. Secondary exits refer to all types of exits through the secondary market.

The *crisis* variable is a dummy that is meant to cover funds with vintage during any of the financial crisis. This variable equals 1 if the fund's vintage is 2000, 2001 or 2007, and zero elsewhere.

The *domestic* variable is a dummy that equals 1 if the fund has only invested in domestic companies, and zero elsewhere. This variable is constructed to test whether it is a relationship between domestic/foreign investments and the occurrence of Zombie Funds.

We do also want to control for fund size in our regression analysis. The *small* variable equals 1 for the lowest 50 percentiles of fund value, and zero elsewhere.

5.3 Identification: Zombie Funds

During the past decade, the world's economy has been through two major downturns, where both have had a great impact on the PE industry. Prior to the dot-com bubble, the amount of funds established peaked in 2000, being fueled by the growth the economy experienced on during that particular time. In 2000, PE firms raised $250 billion of new capital, with an outburst of new companies being invested in by venture capitalists[22]. The aftermath of the Internet bubble burst showed that the PE industry was severely hurt. Many of the portfolio companies were in the technology and communication industry, which were subject to heavy write-offs. Ultimately, the PE firms were left with funds that were extremely hard to liquidate. Instead of losing money on a fire sale or a costly restructuring, the GP would therefore have incentives to keep the funds alive and charging fees to LPs.

Through the financial crisis in 2008-2009, the PE industry experienced a similar downturn as under the dot-com bubble. In the lead-up to the financial crisis, the global private equity market reached new heights, and the PE firms were struggling to invest all the committed capital that was flowing in[23]. The overflow of cash drove the prices upwards, forcing the PE firms – in competition with each other – to pay overprices for the portfolio companies. However, when the crisis hit, the transaction volume fell ruthlessly, and funds started to struggle with underperformance and distressed companies in their portfolio[24]. The repercussion of the financial crisis reduced the available capital dramatically, making PE investments less attractive and harder to complete. The liquidity trap can be shown in Figure G, where the average holding period of a portfolio company has increased significantly since 2008. This illustrate that GPs are now more often struggling to liquidate its assets as early as before.

With the zombie fund definition in mind, it would be fair to assume that this type of funds would have a higher probability to occur when such crisis arises. This is the rationale to examine funds with a vintage as old as 1998, in order to grasp both of the economic downturns of the last decade. In dry markets, e.g. the post-financial crisis credit crunch, it is

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[22] *"Private Equity: Past, Present and Future"* (2003). Colombia Business School
[23] *"Why Private Equity has Built up a Money Mountain"* (January 2013). The Treasurer
[24] *"Private Equity in the Wake of Economic Crisis"* CDI Global

harder to liquidate the investments, especially with a decent return, making the funds more exposed to a zombie status.

Thus, by examining funds with vintage from 1998 until today and look for those GPs that have yet to raise a follow-up fund 7 years after the commencement of the fund, we should be able to identify funds that can be placed in the potential zombie fund category. This category must of course be adjusted for liquidated funds, and for funds where the GP is not active anymore. Thus, we define *Potential Zombie Fund (potzf)* as a dummy variable that is 1 if the examined fund meet our criteria mentioned above, and 0 otherwise.

5.4 Methodology and Hypotheses

Our empirical analysis is separated into two main parts: In the first part, we want to identify zombie funds in the Nordic PE market. We do this by applying the investigation method described in the previous section, 'Identification: Zombie Funds'. We do also examine different characteristics of the identified Zombie Funds, and compare them to 'Normal' Funds. Among others, we look at the vintage and country distribution and at fund sizes.

In the second part of the empirical analysis, we apply a multivariate regression framework to test the probabilities of the occurrence of different exit types for a Zombie Fund versus a 'Normal' Fund. The investments in portfolio companies are realized through exits, and if the fund is unable to exit the portfolio companies, the investors do not get any distributions. Thus, due to the absent of other interim performance measurements, an exit can be seen as a success criteria for a PE fund. The exit types do naturally vary in return, but an empirical study shows that the return from the different exit types differ from year to year. There has not been any exit type that outperforms other during the last years[25]. We apply logit regression analyses in order to test the different exit type probabilities, and use different variables to control for the effects. We expect to observe that zombie funds are less likely to complete exits of its portfolio companies. This hypothesis relates to all of the exit types we are testing for, but we expect to observe that zombie funds are more likely to have portfolio companies that exits through the Secondary market or Other exit types (e.g. restructuring or leveraged recapitalization). Exits through Secondary market have been opted as a possible remedy for zombie fund situations.

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[25] Pitchbook and Grant Thornton. *"Private Exits Report 2012 Annual Edition*".

Ultimately, we test if zombie funds are more likely to have failed to exit the portfolio companies, by conducting a logit regression analysis. Our hypothesis on this particular issue is that a zombie fund is more reluctant to seek different exit routes, due to the incentive of charging management fees as mentioned earlier.

5.5 Summary Statistics

Table 1 provides summary statistics for the sample applied in our analysis. Panel A shows that our sample consists of a total of 266 Nordic PE funds, and that we have examined 940 exit transactions for these funds.

As shown in Panel B, Finland has raised the highest number of funds during this period, with 31.6 percent of all the Nordic GPs located in Finland. Norway and Sweden follow Finland with 26.3 and 24.8 percent respectively. 16.2 percent of the Nordic funds are from Denmark, while Iceland is playing a minor part in the Nordic PE market.

6. Empirical Analysis

6.1 The Nordic Zombie Fund Landscape

By conducting the analysis process explained in the previous chapter, we identify in Figure B a total amount of *80 potential zombie funds* in the Nordic private equity market. This constitutes *30.1 percent* of all funds in our sample. We label them 'potential' due to the possibility of an abnormal strategic plan, e.g. an investment horizon that exceeds 7 years without raising any successor funds, or some other unforeseen factors. It is nevertheless a substantial amount of the Nordic PE market.

Figure C provides support to the arguments presented in chapter 5.3. We observe two peaks with regard to zombie fund concentration around the economic downturns. The zombie-to-normal fund ratio peaked in 1999 (0.82), before the ratio experienced a sharp decrease the following years. The same tendency can be observed at the lead up to the financial crisis, where we can see a substantial increase in the zombie-to-normal fund ratio up to 2007 (*0.50*). Potential zombie funds with a vintage of 2008 cannot be observed until next year, when the "expiry date" for the next fundraising is due. But if it follows the same trend as under the dot-com bubble, we should expect a decrease in this ratio for the following years.

Out of the 41.444 billion USD that has been raised by Nordic GPs between 1998 and 2007, the total amount of money that is locked up in potential zombie funds is *4.365 billion USD*. This means that *10.5 percent* of the total amount being raised is located in a potential zombie fund. If we relate this percentage to the relative number of potential zombie funds identified in the first paragraph of 32.3 percent, we can draw a conclusion that potential zombie funds tend to be smaller than 'normal' funds. Figure D shows the aggregate fund value that has been raised by a zombie fund, while Figure E depicts the equivalent for a Normal Fund.

Further, we find that the amount of potential zombie funds are evenly distributed between Finland, Norway and Sweden, with 27, 23 and 20 potential zombie funds respectively (Figure F). We only find 8 Danish potential sombie funds of a total of 43 funds, while Iceland is a minor player in the Nordic PE market. If we look at the concentration of potential zombie funds to normal funds, we find no country that stands out, other that Iceland, who has 2 potential zombie funds out of 3 funds in total that was established between 1998 and 2007.

Out of the 940 examined exit transaction between 1998 and 2007, we find an increasing trend of using the secondary market as an exit route (Figure G). From 1998 to 2007, the Secondary exit transactions have increased from 13 percent to 30 percent of the total exit volume. Exit through Trade Sales have been the most common strategy during the whole period, consisting of approximately half of the total exit volume. We also find a minor decrease in the IPO exit volume.

6.2 Zombie Fund Exit Performance

6.2.1 IPO Exit Success

We have applied a logit regression analysis in order to investigate the probability of an IPO exit in a Potential Zombie Fund versus a Normal Fund. The exit through an IPO will be a good indication of success and good performance, for both for the LP and the GP. An IPO would increase the possibility for a decent return to LPs and carried interest to GPs.

Of the 70 IPOs from funds with a vintage between 1998 and 2007, we are only able identify 3 that have been completed by a Potential Zombie Fund in the Nordic PE market. This should be one of the reasons that the *iposuccess* is insignificant, as shown in Table 2. We observe a negative relationship between IPO Exit Success and Zombie Funds, but we cannot conclude that this relationship is statistically different from zero. We find a positive relationship between the two variables for 'Normal' Funds with a highly significant coefficient.

Thus, we can conclude that the probability of an IPO is greater in a 'normal' fund than in a zombie fund. We do also find a significant and negative relationship for the *small* variable. This provide as a clear indication that larger funds is more likely to complete an exit for a normal fund, when controlling for the given variables in Table 2.

6.2.2 MBO Exit Success

In Table 3, we change the main independent variable to *mbosuccess*, which indicates if a respective fund has completed an MBO Exit for one of its portfolio companies. Beside from that, the same variables as in the previous section are used. We can interpret the coefficients as probabilities.

The logit regression coefficients report insignificant outcomes for both zombie funds and Normal funds. We observe a positive relationship between a MBO Exit and both zombie

funds and normal funds. However, only the normal funds' exits have a significant relationship. We also note the negative and highly significant relationship with the *small* variable. This means that larger normal funds are more likely to complete an exit transaction. Thus, we cannot conclude that a zombie fund is more prone or not to a MBO Exit.

6.2.3 Trade Sale Exit Success

In Table 4 we find that Zombie Fund and Normal Fund are positively significant related to *tradesuccess*, by conducting a logit regression analysis, and applying the same control variables as in the previous section. Thus, we cannot conclude that a Normal Fund is more likely to have a Trade Sale of a portfolio company, than a Zombie Fund. We do also note that small is negative significant related to Normal Fund, and we can thus give the same interpretations as in the previous section.

6.2.4 Secondary Exit Success

Table 5 reports the results from the logit regression when applying *secsuccess* as the main independent variable. We find a positive and significant relationship for a Normal Fund. The same coefficient for a Zombie Fund is insignificant, and we can therefore not conclude that the outcome is statistically different from zero. We do also observe a significant coefficient from the *small* variable on a Normal Fund, which is consistent with the findings in our previous regressions.

The Secondary market has been mentioned as a possible remedy for the Zombie Fund situation. But we do not find any supportive arguments for that in this regression.

6.2.5 Other Exit Success

Table 6 provides us the results from the logit regression when *otherexit* is used as the main independent variable. As in the previous sections, we observe a significant coefficient for a Normal Fund, while we cannot conclude that the coefficient is different from zero for a Zombie Fund.

Other exits can be seen as alternative exit routes for the GPs, and is a variety of different methods. We are thus not putting to much effort into interpreting the outcomes from these coefficients. But we notice that a Normal Fund have a significant probability of completing an exit under these circumstances as well, while the Zombie Funds do not return any significant coefficients.

6.2.6 Exit Fail

Our last logit regression analysis has *exitfail* as the dependent variable. This dummy variable is equal to one when a fund has not managed to complete any exit transactions. The *potzf* dummy is the main independent variable in the regression. We do however also control for domestic investments, crisis vintage, fund size and GP's location.

In this regression, we test the probability that a Zombie Fund fails to complete any exit transactions at all. We find a significant relationship between *exitfail* and *potzf*. This tells us that a Zombie Fund is more likely to not being able to exit its portfolio companies. This is consistent with our hypothesis that a Zombie Fund GP would be more reluctant to keep the fund artificially alive. This mainly due to the incentives of charging management fees, which is the main revenue source when the possibility of carried interest, is absent.

Further, we observe that the *small* variable is – to some extent – significant. Thus, we can also draw a vague conclusion that the possibility of an exit failure is higher in smaller funds. The other results do not report any significant coefficients.

7. Conclusion

This thesis identifies 80 Potential Zombie Funds in the Nordic PE market, which amounts to 4.365 billion USD worth of private equity assets. Out of the 266 private equity funds raised in the Nordics from 1998-2007, 30.1 percent are Potential Zombie Funds. In terms of vintage distribution, we observe two periods, during which there was a significant increase in zombie funds, the first being in the build-up to the internet bubble and the second being in the lead up to the financial crisis. Additionally, the zombie fund problem might stabilize or become better, as the post-financial crisis vintages reach maturity, if the repercussions follow the same pattern as during the dot-com bubble. The majority of the potential zombie funds identified in the analysis are VC funds, but also a significant amount is buyout funds. We also find that the Potential Zombie Funds are evenly distributed between Finland, Norway and Sweden, while Denmark and Iceland are minor players regarding to the amount of Zombie Funds raised between 1998 and 2007.

Our findings support the perception that zombie funds are a significant problem in the world of private equity and that they have increased in numbers. A zombie fund represents a situation in which there are no winners. There is a misalignment of interests between the fund manager and the investors, whereby LPs cannot realize their investments and GPs suffer great reputational damage. Thus, GPs find it difficult to raise follow-on funds and LPs cannot rebalance their portfolios.

Furthermore, the potential zombie funds are characterized by inferior performance and they tend to be smaller than normal funds. We do not find that the probability of an exit of a portfolio company from a Potential Zombie Fund is statistically different from zero. This applies for all exit types we tested for. We do however find a positive and significant relationship between a 'Normal' Fund and portfolio exits. We can thus say that a 'Normal' Fund is more likely to complete a portfolio company exit.

We do also find a significant relationship between fund size and Zombie Funds. Our analysis shows that smaller funds are more prone to be a Zombie Fund. We do not however find any significant relationships for the domestic and crisis variables. Thus, we cannot conclude that a Zombie Fund is more likely to being raised during economical crisis, or that a Zombie Fund is more likely to only invest in domestic companies.

Our general conclusion is that Potential Zombie Funds are less likely to exit its portfolio companies compared to 'Normal' Funds. If exits are applied as an interim performance measure, we can say that Zombie Funds underperform other funds in the Nordic PE market.

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9. Tables

Table 1: Summary Statistics
Panel A

VARIABLES	(1) N	(2) mean	(3) total
noofexits	266	3.647	3.647
secondary	266	0.692	0.692
tradesale	266	1.654	1.654
mbo	264	0.280	0.280
ipo	265	0.264	0.264
other	266	0.609	0.609
potzf	267	0.599	0.599
vintage	267	1,996	1,996
small	237	0.464	0.464
crisis	237	0.122	0.122
dtype1	237	0.0211	0.0211
dtype2	237	0.278	0.278
dtype3	237	0.207	0.207
dtype4	237	0.0380	0.0380
zfexit	266	0.143	0.143
normalexit	266	0.530	0.530

Panel B

ManagerCountry	Freq.	Percent	Cum.
Denmark	43	16.17	16.17
Finland	84	31.58	47.74
Iceland	3	1.13	48.87
Norway	70	26.32	75.19
Sweden	66	24.81	100.00
Total	**266**	**100.00**	

Table 2: IPO Exit Success in Zombie Funds versus Normal Funds

This table reports the outcomes of the logit estimators using a successful exit dummy as the dependent variable. In Panel (1) the results is conditional of a zombie fund, while we use a 'normal' fund in Panel (2). The dependent dummy variable equals one when a fund has managed to exit a portfolio company, and zero otherwise. The main independent variable here is *iposuccess*. This variable is equal to 1 if one of the exits in a portfolio is an IPO, and zero otherwise. All other independent variables are control variables described in Chapter 4. In parentheses the standard errors are corrected for heteroskadisticity by using robust standard errors. ***, ** and * represents statistical significance at respectively 1, 5 and 10 percent levels.

	(1) Zombie Fund	(2) Normal Fund
iposuccess	-1.146	2.997***
	(-1.56)	(4.14)
domestic	0.897*	-0.583
	(2.12)	(-1.85)
small	0.552	-1.077***
	(1.37)	(-3.34)
crisis	0.560	-0.202
	(1.03)	(-0.43)
gploc1	-0.794	0.384
	(-1.20)	(0.78)
gploc2	-1.812**	0.0469
	(-2.98)	(0.11)
gploc3	0	0
	(.)	(.)
gploc4	-0.167	-0.253
	(-0.35)	(-0.56)
gploc5	0	0
	(.)	(.)
_cons	-1.754***	0.487
	(-4.11)	(1.47)
r2_p	0.107	0.183
chi2	20.89	42.02
N	234	234

t statistics in parentheses
* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Table 3: MBO Exit Success in Zombie Funds versus Normal Funds

This table reports the outcomes of the logit estimators using a successful exit dummy as the dependent variable. In Panel (1) the results is conditional of a zombie fund, while we use a 'normal' fund in Panel (2). The dependent dummy variable equals one when a fund has managed to exit a portfolio company, and zero otherwise. The main independent variable here is *mbosuccess*. This variable is equal to 1 if one of the exits in a portfolio is a MBO, and zero otherwise. All other independent variables are control variables described in Chapter 4. In parentheses the standard errors are corrected for heteroskadisticity by using robust standard errors. ***, ** and * represents statistical significance at respectively 1, 5 and 10 percent levels.

	(1) Zombie Fund	(2) Normal Fund
mbosuccess	0.409	2.008***
	(0.73)	(3.97)
domestic	0.838*	-0.805*
	(2.03)	(-2.56)
small	0.685	-1.170***
	(1.70)	(-3.85)
crisis	0.481	-0.0929
	(0.92)	(-0.22)
gploc1	-0.751	0.380
	(-1.14)	(0.79)
gploc2	-1.809**	0.0802
	(-3.10)	(0.19)
gploc3	0	0
	(.)	(.)
gploc4	-0.0668	-0.0465
	(-0.14)	(-0.11)
gploc5	0	0
	(.)	(.)
_cons	-1.975***	0.627
	(-4.50)	(1.96)
r2_p	0.0962	0.142
chi2	17.26	37.15
N	234	234

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 4: Trade Sale Exit Success in Zombie Funds versus Normal Funds

This table reports the outcomes of the logit estimators using a successful exit dummy as the dependent variable. In Panel (1) the results is conditional of a zombie fund, while we use a 'normal' fund in Panel (2). The dependent dummy variable equals one when a fund has managed to exit a portfolio company, and zero otherwise. The main independent variable here is *tradesuccess*. This variable is equal to 1 if one of the exits in a portfolio is a Trade Sale, and zero otherwise. All other independent variables are control variables described in Chapter 4. In parentheses the standard errors are corrected for heteroskadisticity by using robust standard errors. ***, ** and * represents statistical significance at respectively 1, 5 and 10 percent levels.

	(1) Zombie Fund	(2) Normal Fund
tradesuccess	1.463***	2.768***
	(3.40)	(7.77)
domestic	1.045*	-0.424
	(2.48)	(-1.19)
small	0.790	-1.175***
	(1.87)	(-3.45)
crisis	0.507	-0.321
	(0.92)	(-0.65)
gploc1	-0.725	0.558
	(-1.08)	(0.95)
gploc2	-1.506**	0.790
	(-2.61)	(1.63)
gploc3	0	0
	(.)	(.)
gploc4	0.106	0.0982
	(0.22)	(0.19)
gploc5	0	0
	(.)	(.)
_cons	-3.142***	-1.127*
	(-5.63)	(-2.46)
r2_p	0.153	0.323
chi2	26.84	72.80
N	234	234

t statistics in parentheses
* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Table 5: Secondary Exit Success in Zombie Funds versus Normal Funds

This table reports the outcomes of the logit estimators using a successful exit dummy as the dependent variable. In Panel (1) the results is conditional of a zombie fund, while we use a 'normal' fund in Panel (2). The dependent dummy variable equals one when a fund has managed to exit a portfolio company, and zero otherwise. The main independent variable here is *secsuccess*. This variable is equal to 1 if one of the exits in a portfolio is a Secondary Sale, and zero otherwise. All other independent variables are control variables described in Chapter 4. In parentheses the standard errors are corrected for heteroskadisticity by using robust standard errors. ***, ** and * represents statistical significance at respectively 1, 5 and 10 percent levels.

	(1) Zombie Fund	(2) Normal Fund
secsuccess	-0.181	2.571***
	(-0.40)	(6.29)
domestic	0.856*	-0.517
	(2.06)	(-1.55)
small	0.627	-0.876**
	(1.57)	(-2.65)
crisis	0.481	-0.0711
	(0.91)	(-0.16)
gploc1	-0.764	0.559
	(-1.17)	(1.10)
gploc2	-1.781**	-0.0141
	(-2.98)	(-0.03)
gploc3	0	0
	(.)	(.)
gploc4	-0.138	-0.235
	(-0.29)	(-0.49)
gploc5	0	0
	(.)	(.)
_cons	-1.835***	-0.0559
	(-3.91)	(-0.16)
r2_p	0.0947	0.255
chi2	16.17	51.98
N	234	234

t statistics in parentheses
- p<0.05, ** p<0.01, *** p<0.001

Table 6: Other Exit Success in Zombie Funds versus Normal Funds

This table reports the outcomes of the logit estimators using a successful exit dummy as the dependent variable. In Panel (1) the results is conditional of a zombie fund, while we use a 'normal' fund in Panel (2). The dependent dummy variable equals one when a fund has managed to exit a portfolio company, and zero otherwise. The main independent variable here is *otherexit*. This variable is equal to 1 if one of the exits in a portfolio is an Other Exit Transaction, and zero otherwise. All other independent variables are control variables described in Chapter 4. In parentheses the standard errors are corrected for heteroskadisticity by using robust standard errors. ***, ** and * represents statistical significance at respectively 1, 5 and 10 percent levels.

	(1) Zombie Fund	(2) Normal Fund
otherexit	0.649	1.862***
	(1.57)	(4.84)
domestic	0.894*	-0.603
	(2.11)	(-1.92)
small	0.679	-1.225***
	(1.70)	(-3.76)
crisis	0.338	-0.577
	(0.64)	(-1.30)
gploc1	-0.736	0.402
	(-1.14)	(0.77)
gploc2	-1.731**	0.241
	(-2.94)	(0.56)
gploc3	0	0
	(.)	(.)
gploc4	0.0164	0.0496
	(0.03)	(0.11)
gploc5	0	0
	(.)	(.)
_cons	-2.178***	0.260
	(-4.60)	(0.77)
r2_p	0.105	0.178
chi2	18.15	39.44
N	234	234

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 7: Exit Fail in Zombie Funds

This table reports the outcomes of the logit estimators using an exit failure dummy as the dependent variable. The dependent dummy variable equals one when a fund has not managed to exit a portfolio company, and zero otherwise. The main independent variable here is *potzf*. This variable is equal to 1 if a fund is identified as a Potential Zombie Fund, and zero otherwise. All other independent variables are control variables described in Chapter 4. In parentheses the standard errors are corrected for heteroskadisticity by using robust standard errors. ***, ** and * represents statistical significance at respectively 1, 5 and 10 percent levels.

	(1) Exit Fail
potzf	0.982**
	(3.14)
domestic	0.0340
	(0.11)
small	0.738*
	(2.31)
crisis	-0.352
	(-0.72)
gploc1	0.348
	(0.68)
gploc2	0.998*
	(2.48)
gploc3	0
	(.)
gploc4	0.428
	(0.94)
gploc5	0
	(.)
_cons	-1.874***
	(-5.07)
r2_p	0.104
chi2	28.97
N	234

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

10. Figures

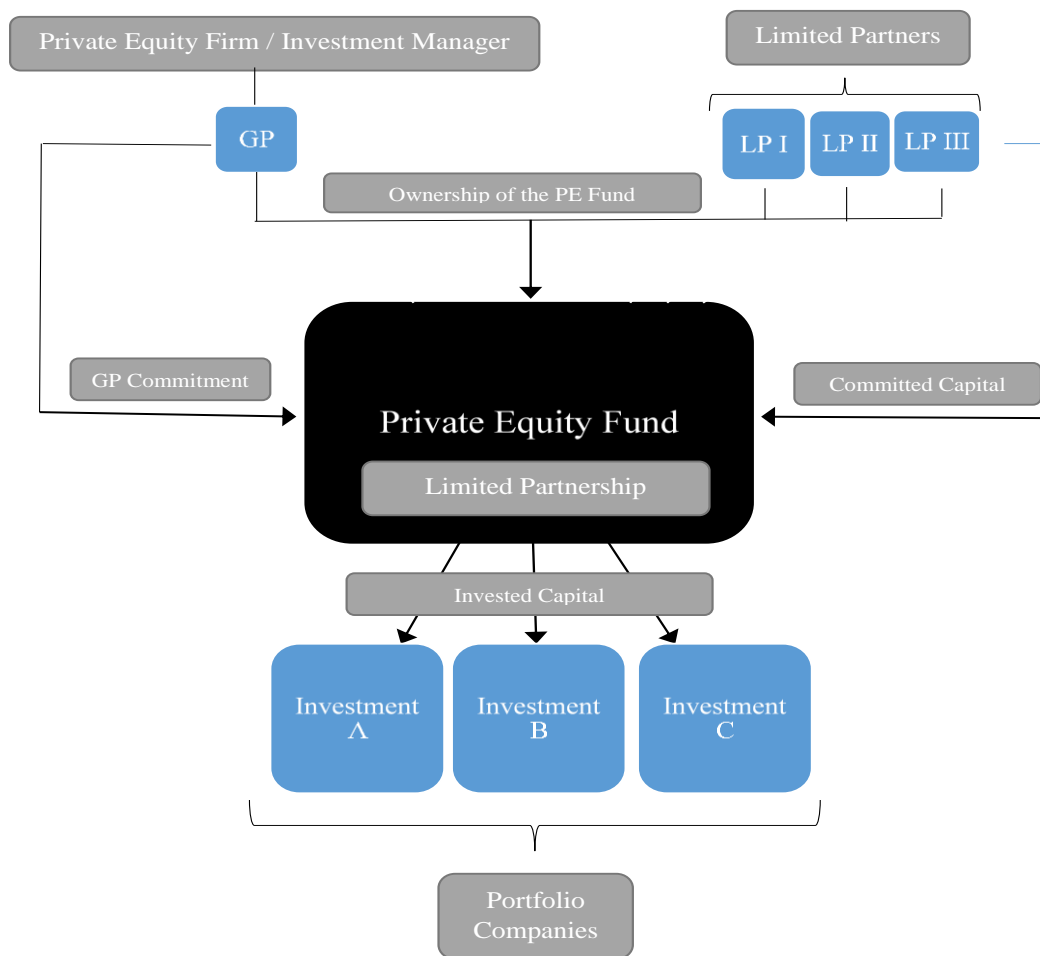**Figure A: Private Equity Fund Structure**

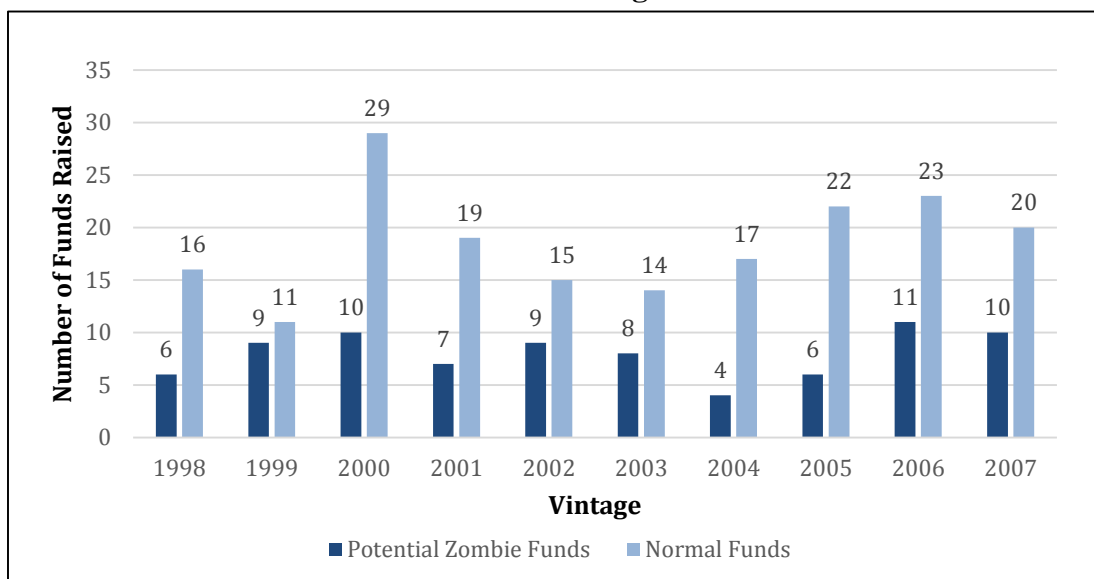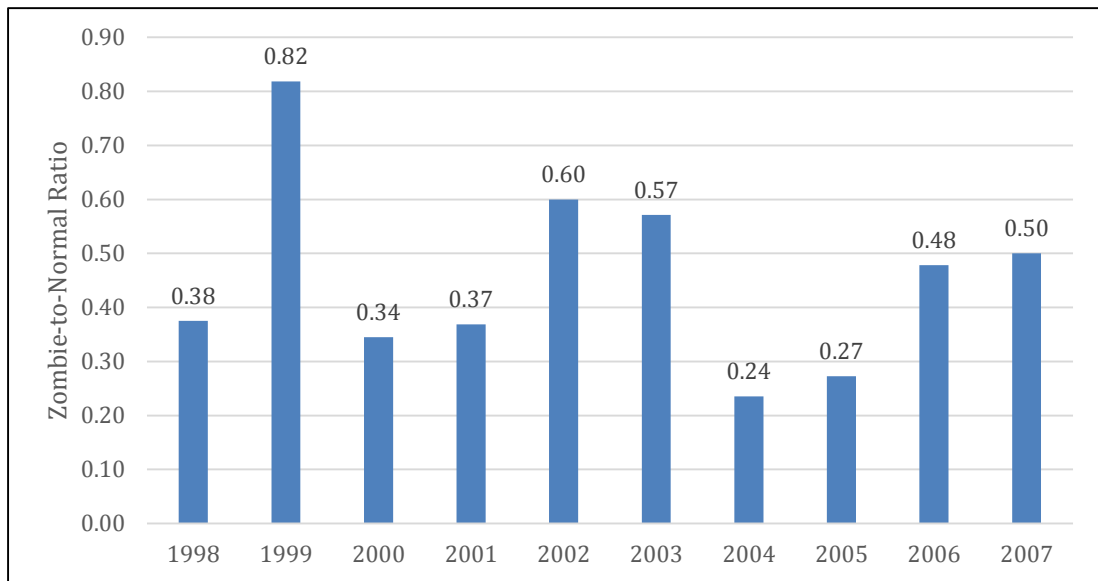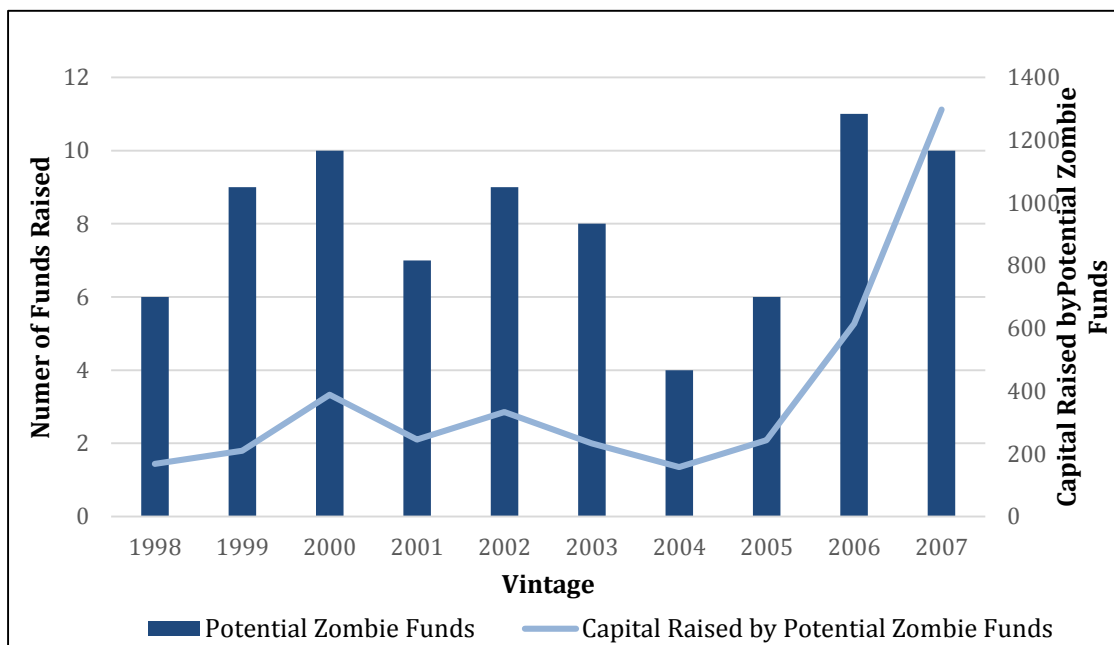**Figure B: Zombie Fund versus Normal Fund Vintage Distribution**

Figure C: Zombie-to-Normal Ratio

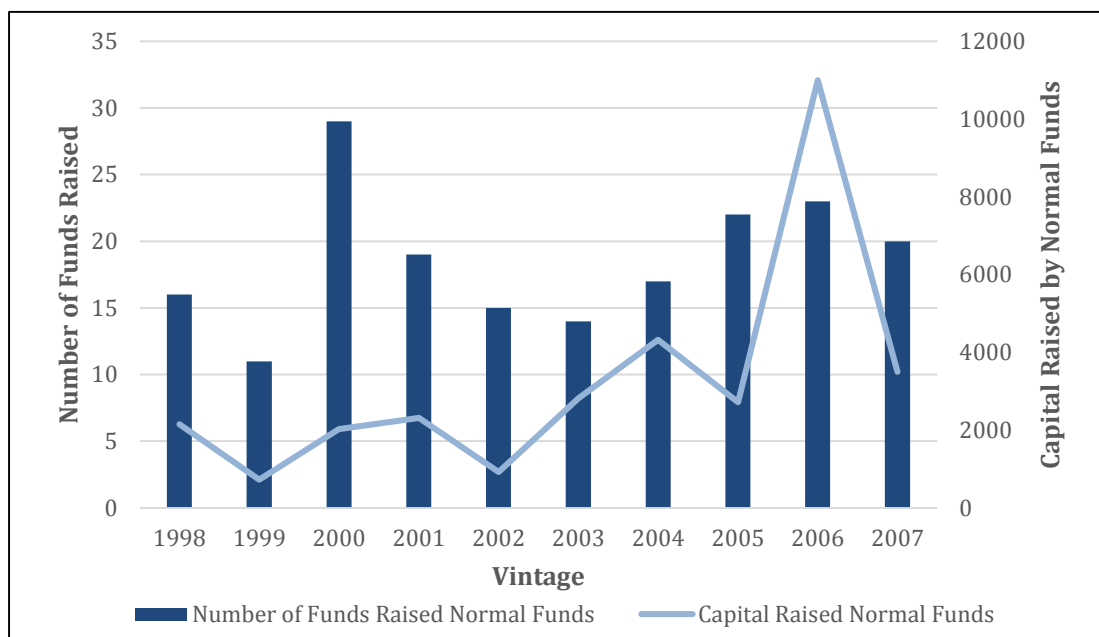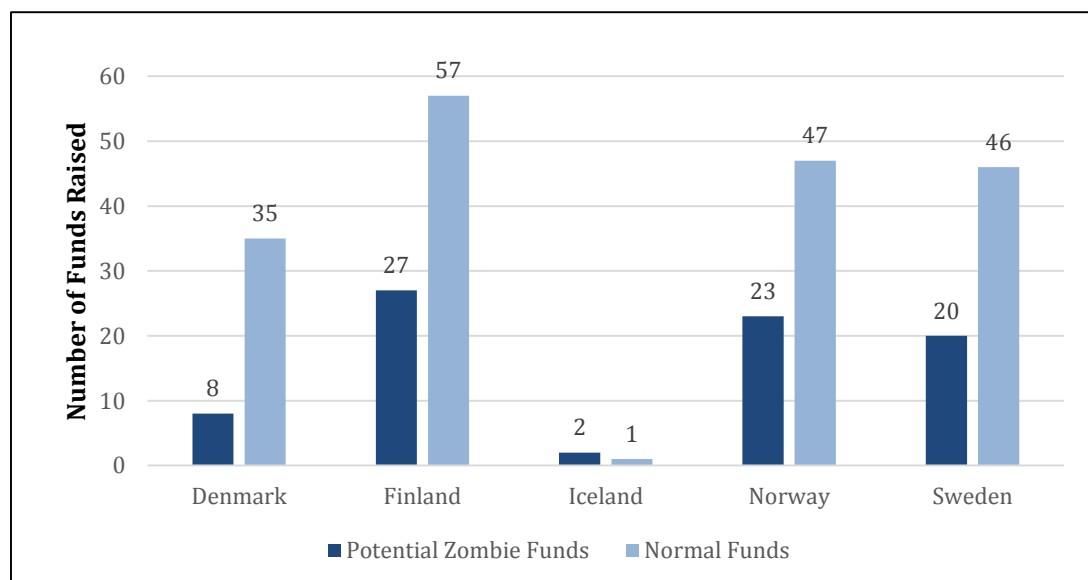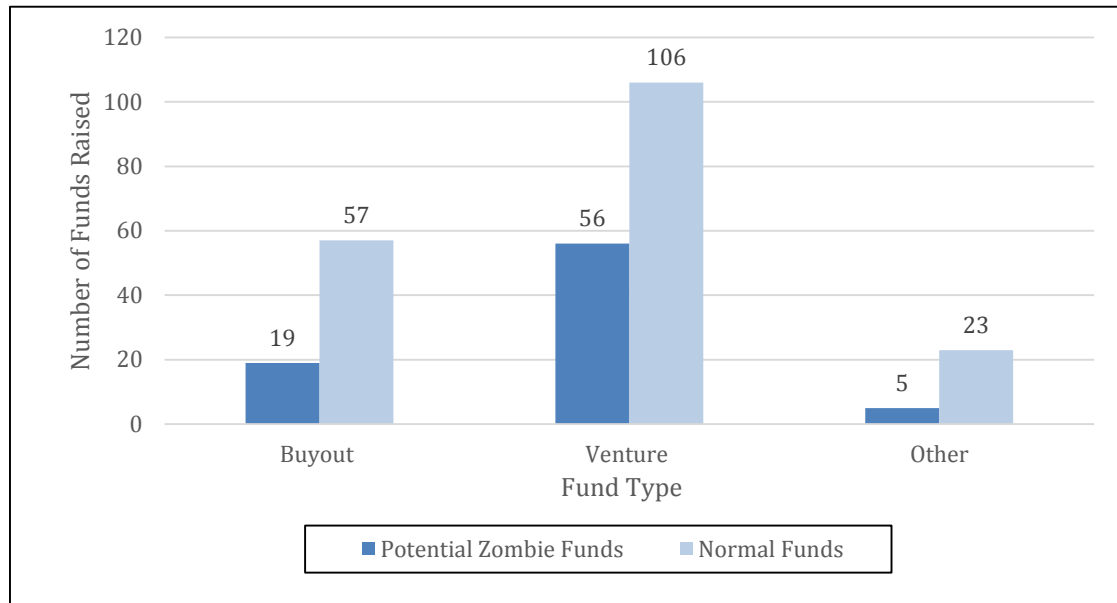## Figure D: Zombie Fund Aggregated Value

Figure E: Normal Fund Aggregated Value

Figure F: Zombie Fund Country Distribution

Figure G: Zombie Funds by Fund Type

Figure H: Breakdown of Holding Periods for Private Equity-Backed Portfolio Companies by Year of Exit, 2006 - 2014 YTD. (Source Preqin)