On the performance of private equity investments: does market timing matter?[1]

Daniel Schmidt
Investment Manager, Venture Capital Management

Eric Nowak
Professor of Financial Management and Accounting, University of Lugano

Alexander Knigge
Consultant, Lufthansa Consulting

Abstract

This paper investigates the market timing abilities of private equity fund managers using a unique set of cash-flow data. We show that investment timing has an impact on the performance of venture-capital funds. However, divestment timing has no such impact on returns. For buyout funds we reveal that performance is not driven by market timing but is significantly related to the experience of the individual fund manager. Thus, for successful investing into mature companies, getting access to better deal flow and managing the investment affect the resulting success. Our results complement recent findings on the performance of private equity funds.

1 All data for this project were obtained from the CEPRES Center of Private Equity Research (www.cepres.com). We gratefully acknowledge E.U. financial contribution within the RICAFE (Risk Capital and the Financing of Innovative Companies in Europe) research network under contract no. HPSE-CT-2002-00140. We thank Douglas J. Cumming, Marina Balboa, Marco Da Rin, Thomas A. Rietz, and Mark Wahrenburg for very helpful comments.

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"As with most things, timing Is everything. And if you can't control the timing, then what happens is very dependent on luck." Bob Johnson, Managing Partner, Founders Capital Partners, Timing is Everything: What's New in Venture Capital. MIT alumni opinion column: What Matters, February 2002.

Introduction

Private equity plays an essential role for financing innovative companies and business sectors in the economy. These funds not only constitute an important source of financial funding but also represent a key monitoring device for young growth companies. Although research interest in private equity has increased remarkably during the last years, little is still known about the performance characteristics of private equity as an asset class. This paper attempts to fill this gap.

For mutual funds and hedge funds it is common practice to break down portfolio performance into two components, namely, security selection and market timing. For private equity funds, portfolio performance has not been split up into company selection and overall market timing so far. However, it is generally assumed that venture capitalists have the ability to time the market for taking their portfolio companies public, and early research by Barry et al. (1990) and Lerner (1994) seems to support this view. Casual observation tells us that during the technology bubble years many private equity funds destroyed money, because they invested too late, at unreasonable valuation levels, and were too slow to exit from their investments[2]. In a recent study, Ljungqvist and Richardson (2003a) show that there is high variation in the speed with which funds draw down committed capital, and invest it deal by deal[3]. Thus, although private equity funds do not invest into publicly traded assets and portfolio composition decisions are made less frequently, market timing supposedly plays an important role in the overall fund performance.

Even if this issue is vastly unexplored academically, casual observation confirms different timing activities.

The objective of this paper is to investigate the market timing abilities of private equity fund managers, using detailed cash flow information from a unique database of private equity funds. With timing ability we mean deal-by-deal investment timing ability of individual fund managers – within the funds' lifetime – not entry timing of funds at the general industry level[4].

Overall, our findings show that while investment timing has an impact on the performance of venture capital (VC) funds, divestment timing does not. For later-staged buyout (BO) funds our analysis reveals that fund performance is not driven by market timing but is significantly related to the experience of the individual fund manager. Thus, for successful investments in more mature portfolio companies, getting access to better deal flow and managing the investment has a greater impact on the resulting success of these investments than market timing. These results are consistent with other recent findings on the performance of private equity funds.

Related literature

While the earlier studies of the private equity market were based on aggregate data from public databases, such as VentureOne or VentureExpert, there is now a growing literature on the subject which examines the return of private equity investments more closely and with more detailed data. For example, Kaplan and Schoar (2005) investigated individual fund returns and found that performance increases with experience and is persistent. They also show that better performing funds are more likely to raise follow-on funds. Ljungqvist and Richardson (2003a, b) used a dataset that comes closest to the CEPRES (Center of Private Equity Research) database, in terms of detailed information on cash flows of individual investments, to analyze the behavior of private equity fund managers, and found that fund managers time their investment and exit decisions in response to competitive conditions in the market for private equity. In particular, they find evidence that competition for deal flow with other private equity funds affects the investment timing.

2 Himelstein, L., 2001, "Crunchtime for VCs," Business Week, February 19

3 For an investment of 80% of the funds' committed capital, Ljungqvist and Richardson (2003a, p. 11) show a time period starting from funds closing of between one and ten years.

4 The time it takes to raise a fund – the entry timing – is a function of the managers' ability to raise a fund. It is dependent on the willingness of investors to invest, which is often driven by herd behavior. Both decisions, the one to raise a fund and the one to make actual portfolio investments, are based on different goals and should usually be separated by as much as possibly allowed by the investment statutes.

Finally, Cumming and Walz (2003) test another sample of the CEPRES dataset for determinants of return.

However, none of these studies explicitly incorporate the ability to time the market as a potential contributor to the overall fund performance. The contribution of our paper is that we are the first to analyze the impact of deal-by-deal (within-funds) investment timing ability on performance.

In this paper, we aim to investigate whether fund managers can cope with this competitive pressure by micro-timing the market according to current valuation levels. In addition, we test for the impact of timing on fund performance. When valuation levels change, we implicitly assume changing investment opportunities with respect to the investment price. Ljungqvist and Richardson (2003a) show that improvements in investment opportunities increase performance. Since it is difficult to quantify the manager's access to high quality deal flow, we try to control for this effect by including proxy variables that capture the fund manager's experience.

Description of the dataset

General description

The general lack of in-depth quantitative research on private equity fund performance is most likely due to the private nature of the whole industry. While disclosure requirements force mutual funds to release information to the public (enabling their use in academic research), private equity companies are reluctant to provide in-depth financial information. This is understandable, since information on returns is proprietary and full revelation is likely to result in a competitive disadvantage for the disclosing partnership. As a result, empirical research on the performance of private equity has been based mainly on aggregate data until most recently.

The dataset used for this paper is derived from the records of CEPRES, which, although completely anonymous, provides high quality and in-depth data with a great level of detail. For example, it provides information on gross cash flows, not adjusted for management or success fees, on a monthly basis[5]. In some cases, additional information on compensation is also given. The data can be obtained either at the fund level or for each portfolio company. Together with detailed cash flow data, the dataset also provides information about the investment manager. Furthermore, the sequence of the fund – which denotes the number of funds a particular investment manager has raised up to date – is also supplied. Consequently, this information allows us to create a track record for every investment manager with respect to fund performance and other criteria. The dataset contains both venture capital (VC) and private equity buyout (BO) funds. As of September 13th, 2003, the dataset included 64 investment managers, 203 funds, 4,913 investments, and 4,306 portfolio companies[6].

Vintage year	Frequency	Percentage	Cumulative percentage
1971	1	1.43	1.43
1981	1	1.43	2.86
1983	2	2.86	5.71
1984	2	2.86	8.57
1986	4	5.71	14.29
1987	3	4.29	18.57
1988	3	4.29	22.86
1989	6	8.57	31.43
1990	5	7.14	38.57
1991	3	4.29	42.86
1992	8	11.43	54.29
1993	5	7.14	61.43
1994	7	10.00	71.43
1995	3	4.29	75.71
1996	7	10.00	85.71
1997	7	10.00	95.71
1998	3	4.29	100.00
Total	**70**	**100**	

Figure 1 – Sample overview by vintage year frequency

In order to analyze the funds' real returns, as well as investment (divestment) timing, we had to restrict the dataset to completely realized funds, or those near to complete realization. Of course, all funds used in our study have finished the investment phase. Due to complete cash flow information on every funds' portfolio constituent, as well as net asset value information (if the single investment is not completely real-

5 We find that net cash flows are in the range of around 55 percent of the gross cash flows.

6 The cut off date for this analysis was March 2003, i.e., funds that were added after March were not included in the analysis. There is a difference between the number of companies and the number of investments (overall investments, not investment rounds) due to syndicated investments in the same company by different funds.

ized), we know exactly the overall fund realization stage. Assessing the funds on a deal-by-deal basis, we reduce the sample to 70 funds, managed by 36 different investment managers[7]. These funds are mature enough to determine the real final fund performance. Thus, following Ljungqvist and Richardson (2003a), we concentrate on the generation of mature funds. However, in contrast to their study, we do not generally cut off all funds raised after a certain date[8]. We analyze the funds' realization status individually on a deal-by-deal basis. To calculate the investment or divestment timing proxy as well as the fund performance, we utilize cash flows, which represent the amount of money flowing between the company and the limited partnership. If stocks from IPO exits are distributed, we measure their particular market value given at that date.

Descriptive statistics

We analyze funds raised in vintage years between 1971 and 1998. Figure 1 gives an overview of the funds' frequency distribution over the years. Of course, due to an increased deal flow, the number of analyzed funds is slightly higher in the 1990s. When looking at the life cycle of these transactions, we find that the very early funds from the 1970s mainly consisted of buyout investments. Given that our sample covers venture capital funds starting in the 1980s means that it also includes older investment firms managing buyout portfolios. Nevertheless, on average there is no big difference between venture capital and buyout managers concerning their investment history. In terms of partnership age, we can observe a slightly longer investment history and a higher number of previously raised funds for buyout managers than for VC managers.

When we calculated the mean gross IRRs for buyout and venture funds (Figure 2), we found them to be 39.15% and 63.8%, respectively, which corresponds to an overall IRR of 47.4%. All analyses are based on gross IRRs. A separate analysis of 80 private equity funds[9], where we compared real net to gross IRRs – with management fees, carry interest payments, and other costs subtracted – revealed that a 45% depreciation on gross IRRs was needed to generate net values.[10]

	Minimum	Maximum	Mean	Std. deviation
Annual (gross) IRR	1.00%	348.00%	47.38%	55.96%
Age of investment firm	0.00	44.00	7.69	10.58
Date of closing	15.11.1971	15.03.1999	26.11.1991	
# previous funds (track record)	0.00	20.00	2.87	3.78
# of fund	**Absolute frequency**	**Frequency**	**Cumulated %**	
1	29	41.43%	41.43%	
2	18	25.71%	67.14%	
3	10	14.29%	81.43%	
4	4	5.71%	87.14%	
5	4	5.71%	92.86%	
6	1	1.43%	94.29%	
more	4	5.71%	100.00%	
sum	70			
Sample fund characteristics				
U.S. funds			65.15%	
Reduced sample of 41 funds				
Fund size	€11.18 M	€2022 M	€233.48 M	€431.96 M

Figure 2 – Descriptive statistics full sample

All information is based on gross IRR data. The net IRRs (management fees, carry interest payments and other costs subtracted) are valued on average with 55% of gross values. This is based on a sample of 80 private equity funds. We have only fund size information for a reduced sample of 41 funds (41 out of 70).

For both subgroups, VC and buyout, more than half of the private equity investment firms were originated in the U.S. (between 61% and 67%). This corresponds to the market volume of funds raised worldwide. The number of first time funds without investment history is around 35%, thus the sample is well balanced. Unfortunately, we have no information of fund-managers that had not been in business until the mid-1990s. A reduced sample set was providing information on size. The mean fund size was €233 million, strongly varying in a range between €12 and €2002 million.

Empirical analysis

The main objective of the empirical analysis is to answer the following two questions. Firstly, does the market valuation level affect investment or divestiture decisions of private equity fund managers? Secondly, does a positive correlation between market timing ability and fund performance provide

7 Thirty funds were realized completely, the other 40 funds were almost complete realized with no large distributions and performance changes expected. The general results are robust with respect to using the subset of fully realized funds.

8 In their case the cut-off vintage year is 1993.

9 Note that this is a different sample consisting of all CEPRES funds for which net and gross information were available, even if they were not realized.

10 The average or median IRRs are slightly higher than they are published in other studies which are based on VentureEconomics or VentureOne data. However, Kaplan et al. (2002) reveal a tendency to exert a downward bias on returns if those data are used compared to real life data.

evidence that market timing matters for overall fund performance?

Market timing abilities are analyzed separately for the investment (investment timing) and for the divestment phase (divestment timing), respectively. Additionally, we develop a joint measure for total market timing ability (total timing) during both the investment and the divestment stage. In order to measure joint influences of investment and divestment timing ability we include both timing proxies as explanatory variables in the regression analysis. Subsequently, we examine the relationship between 'positive' market timing ability and fund performance.

Market valuation index selection

Ideally, an empirical model of private equity investment timing should be based on the valuation data of the global private equity industry. However, due to limited data availability[11], we use the NASDAQ Composite as main market valuation index for our analysis. This seems reasonable, given the high average and median correlation between the NASDAQ Composite and the relative valuation of the Private Equity industry of 0.846 and 0.815, respectively[12].

A measure to evaluate relative market valuations

As mentioned before, private equity fund managers are unable to invest or divest immediately on short notice, due to the illiquid nature of the underlying assets. However, although fund managers cannot take advantage of daily market fluctuations, they can be assumed to regard the relative market valuation level on a quarterly or yearly time horizon. If they intend to time the market, they have to invest during periods of low market valuations and divest during phases of high market valuations[13].

Due to the extraordinary development of NASDAQ, we cannot straightforwardly compare actual cash inflows and outflows of a fund with the absolute monthly valuation level. Investments made before the bubble would obviously outperform investments carried out after 1998, most of the time, if compared that way. To identify the relative monthly valuation levels over the entire lifetime of NASDAQ, we divide the absolute monthly valuation index by a moving average over the same month. Applying 36 month moving averages, the relative market valuation level is displayed on a monthly basis, depending on the absolute valuation level (18 months) before and after the behold month. The following equation is used to compute the 36-month-moving averages:[14]

$$y^*_t = 1/36\ [(1/2\ y_{t-18}) + (1/2\ y_{t+18}) + \sum_{\tau=t-(k-1)}^{t+(k-1)} y\tau \quad (1)$$

where, y* is the moving average of Nasdaq index, t is the date (month, k = 1,..18 month), and y is the Nasdaq index level

Next, to determine the monthly valuation levels of NASDAQ, we divide the absolute monthly index by the computed moving average. Thereby, a measure for the relative monthly valuation level is created. The following equation illustrates the computation of the monthly valuation level measure: Relative Market Valuation (t) = Index (t)/y*(t) (2). The 36-month time period, which is the basis of the Relative Market Valuation level calculation, can be seen as that time period within which the investment manager is able to time the market.

Analysis of market timing ability

To determine the relative monthly investment activity level of each fund, we use the following ratio: I_t = negative cashflow$_t$/Total negative cashflows (3). To examine market timing abilities during the investment phase, we compute the correlation between the relative market valuation level[15] and the investment activity ratio I_t on a monthly basis. Months without any investment activity are excluded from the analysis[16].

11 Whereas the cash flow data on fund level goes back to 1971, the relative valuation of the private equity industry is only available from 1983.

12 The private equity valuation index used is provided by VentureEconomics

13 An example of perfect market timing would be an investment carried out in 1994/95 (before the Technology bubble) followed by a divestiture through IPO, right during the peak of the bubble in early 2000. As a matter of fact, market timing of the overall market valuations is not the only variable which determines the valuation of individual companies. However, it is impossible to indicate real under- or overvaluations of the sample companies before the investment decision. We believe that the market valuation level displays the average investment valuation in an adoptable manner.

14 This corresponds to the time period (commitment period) within which the fund manager is able to time his investment decision on a deal-by-deal basis.

15 Computed by dividing the absolute monthly valuation index by a moving average of the same month.

16 By excluding the months without any investment activity from analysis, however, we do not ignore this useful information of doing nothing as a kind of market timing. Private equity funds are organized as closed end funds with a fixed fund size. This capital amount is raised before starting the investment activities and has to be allocated to certain portfolio companies within the commitment period (usually 36 months). As a variable for favorability of the investment environment, we calculate relative valuation levels over this time period. Since the investment manager has to allocate the fixed amount in a fixed time period, we can measure timing ability on the basis of relative valuation levels (over the commitment period) by exclusively observing investment activities. Hence, the timing decision in form of no activity is implicitly taken into account by analyzing all investment activities.

A negative correlation is evidence in favor of fund manager's positive market timing ability, since his investments were mainly undertaken at low market valuations. The higher the negative correlation, the better is the timing ability of the fund manager. A correlation of minus one [-1] would imply that the fund manager has perfectly timed the market during the investment phase. A positive correlation, instead, illustrates that the fund manager has not carried out most of his investments at favorable market valuation conditions. To determine the number of funds that have timed the market during the investment phase, we add up all funds with a negative correlation. Although the individual level of market timing ability varies, a negative correlation generally implies that the fund manager was at least to some extent concerned with timing the market.

In a similar manner, we compute the following monthly ratio to scale each fund's activities during the realization/divestment period: D_t = Positive cash flow$_t$/Total positive cash flows (4). To evaluate the timing abilities of fund managers during the divestment period, we again examine the monthly correlation between the relative market valuation level and D_t. Months without any divestiture activity are excluded from the analysis. Since divestitures should be undertaken during periods of high market valuations, a positive correlation indicates positive market timing ability. Once more, a correlation of one [+1] would imply perfect market timing behavior of the fund manager. A negative correlation, in contrast, implies that the fund manager has not divested the majority of its investment at favorable market conditions. As before, we sum up the funds that have a positive correlation to get the absolute number of funds that have positively timed the market during the divestiture phase. In the following, the correlation coefficient which indicates the extent of investment or divestment timing ability is named 'investment timing' or 'divestment timing,' respectively.

In order to answer the second question, which is whether there is a relationship between positive market timing ability and fund performance, we perform several OLS regressions, where fund performance (measured by gross IRR)[17] is used as dependent variable and market timing ability (timing proxy) is used as the independent variable[18]. The first set of regressions examines the relationship between market timing ability during the investment phase (investment timing) and overall fund performance (IRR). A second set of regressions examines the relationship between market timing ability during the divestiture (divestment timing) phase and overall fund performance (IRR). Finally, we look at the absolute market timing abilities of private equity fund managers. Total market timing ability (total timing) is derived from a distance analysis of the individual correlations with the value of perfect market timing, which is [–1] for the investment period and [+1] for the realization phase. Both distances are separately computed and subsequently added together to create one overall measure of market timing. Following the separate analysis of investment and divestment timing ability, we test for robustness by an inclusion of both timing proxies as explanatory variables in one regression (analyses are available upon request). We, therefore, again pay attention to the joint influence of investment and divestment timing ability on fund performance.

As control variables we introduce experience proxies. We include the variables age of venture capital firm and track record (number of previous funds raised, # funds) in the regression model, in order to account for the possible impact of experience – and thereby access to deal flow. The rationale for this is that industry observers say it is easier for an experienced private equity manager to attract deals with high expected returns.

Following Ljungqvist and Richardson (2003a) we account for the influence of a high or low competition for deals on fund performance. It is shown by Gompers and Lerner (2000) that during periods when commitments to private equity funds are large, the high level of competition for deals lowers the average fund performances. By including the variable log(real fund inflow same vintage year), which describes the amount of investable capital in the market at date, we further sepa-

17 Management fees and carried interest payments are changing between funds. The compensation payments are influenced by negotiations between the investors and the funds as well as their bargaining power. Ljungqvist and Richardson (2003b), explain that the distribution of excess returns (who is earning the money – the investor or the fund manager?) depend on the contractual arrangements between the private equity fund and the investor. We intend to show the influence of timing abilities on the real performance which is gross of fees.

18 Panel data methodology is applied.

rate the influence of market timing ability on fund performance in the analysis[19]. We also account for differences in the available capital for VC and BO investments by using the real fund inflow to BO or VC, respectively.

Finally, we split up the entire set of funds according to their investment characteristics in order to investigate smaller subsets and further verify the regression results obtained from the analysis before. We identify a total of 24 VC-funds and 46 BO funds, which we examine through further regression analysis in order to ascertain whether there is a link between fund performance and market timing ability.

Results

As shown in Figure 3, the correlation results illustrate that private equity fund managers invest and divest to a limited extent in accordance with favorable market conditions. Applying the relative valuation level over the surrounding 36 months, we appreciate the fact that a private equity investment manager is only able to take advantage of the valuation benefits within the investment or divestment period given by his statutes.

With respect to investment timing, 62.86% of the funds analyzed had a negative correlation, which indicates good investment timing.[20] However, the average and median correlation of all funds analyzed are only -6.43% and -4.10%, respectively. Furthermore a correlation of -20 percent, on average (when considering only funds with a negative correlation), demonstrates strong positive market timing capabilities – with respect to fund managers who are definitely timing the market. Only two out of all the 70 funds analyzed show correlations of less than -0.5 during the investment phase. This confirms the fact that exact market timing is almost impossible due to the illiquidity of this asset class. Moreover, due to a lower elasticity of private equity investment valuations to market valuations, an exact timing (here indicated by a correlation of minus one) is not essential. A negative timing proxy is sufficient evidence of a particular manager's abilities to time the market (in the sense of macro-economical farsightedness).

Regarding the divestment phase, the correlations show a similar pattern. 55.07% of all funds have a positive correlation, which indicates positive divestment timing ability. The average and median for all funds is 4.99% and 2.86% respectively. Thus, although the majority of fund managers time the market during the divestiture phase, the low correlations indicate that they are not able to do so consistently in a favorable market environment. A separated analysis of those fund managers who are timing divestments shows that there is a 21% correlation between the divestment and favorable exit valuation levels. Even though lots of funds show relatively favorable investment timings, there are substantial differences in the funds' timing abilities. Pertaining to the investment phase, only two out of 70 funds exhibit nearly perfect

	All funds (N=70)		VC funds (N=24)		BO funds (N=46)	
	Investment timing	Divestment timing	Investment timing	Divestment timing	Investment timing	Divestment timing
Average	-6.43%	4.99%	-3.33%	12.79%	-8.06%	0.82%
Median	-4.10%	2.86%	-7.26%	11.12%	-3.46%	-1.40%
Max	54.55%	75.81%	54.54%	75.81%	44.94%	75.77%
Min	-80.79%	-50.14%	-46.51%	-33.95%	-80.78%	-15.13%
St. dev.	24.54%	24.95%	23.61%	27.97%	25.12%	22.40%
# neg.	44	31	15	8	28	24
# pos.	26	38	9	16	18	22
total	70	69	24	24	46	46
# neg. / total	62.86%	55.07%	62.25%	33.33%	60.86%	52.1%
Mean proxy of good timers	-19.96%	21.00%	-16.09%	27.41%	-22.18%	16.60%

Figure 3 – Average and median investment and divestment timing ability

19 This variable is also used by Ljungqvist and Richardson. We assume that there are a fixed number of good deals in the market. The competition for these deals is higher if there is more capital in the market. We use the item 'net fund commitments by vintage year' for the particular private equity segment, as provided by VentureExpert.

20 38 funds have a negative correlation (out of 70 funds analyzed)

negative correlations [correlations below -0.5]. For the divestiture phase, at least four out of 70 funds show very high correlations [correlations above +0.5]. Figure 3 also presents a separate analysis of VC- and BO-funds' timing abilities, which finds that on average, VC-fund managers do time their exits better than their BO peers. This is in line with the results of Ljungqvist and Richardson (2003a).

To shed some light on the second initial question pertaining to whether 'good' market-timers perform better than 'bad' market timers, we carry out a univariate as well as a multivariate regression analysis. Figure 4 outlines the results of the univariate analysis. We compare the mean fund IRR by dividing the sample according to the value of the independent variables. The cutting point is the median value of investment timing, divestment timing, total timing, age, and the number of previous funds (#funds). The results clearly indicate how far the timing ability influences fund performance. Fund managers with the superior timing abilities achieve a fund return of 64.8%, which is significantly different from the average fund return achieved by fund managers with inferior timing abilities (30.4%). Also divestment timing and total timing abilities seem to matter according to the univariate mean IRR comparison (at a 10 and 5 percent level of significance, respectively). A robustness control based on the experience proxies of age and number of previous funds raised does not show significantly differing mean IRRs.[21]

In the regression, the relationship between timing ability – during both the investment and the divestiture phases – and fund performance was not only scrutinized for the complete set of 70 funds but also for the subsets of 24 VC and 46 BO funds. In general, our regression analysis shows that timing does matter. The regressions generate empirical evidence showing that timing ability is an important factor in overall fund performance. Figure 5 presents the results of the OLS regression. The coefficients of investment timing indicate their positive effect on fund performance – if only at a 10 per cent significance level. To invest in times with favorable market valuations seems to improve fund performance. Surprisingly, the separate analysis of divestment timing does not show any significant influences on performance. Looking at the combined influence of investment and divestment timing (total timing, which can be interpreted as the ability to catch overall positive valuation changes) we find that it does have an influence on fund return. At a five per cent level of significance, fund performance is positively determined by total timing ability.[22]

In this overall analysis we did not find any evidence that experience (#funds) or the competition for deal flow (log(real fund inflow_same vintage year)) has an impact on the funds' performance. The coefficients of the control variables are not significantly different from zero.

Independent variable	Fund's IRR	N	mean	Std. dev.	p-value – equal variances not assumed [equal variances]	Test for equality of variances: p-value
Investment timing	≥ - 4.1%	35	30.36%	30.93%	0.009[a]	0.004
	< - 4.1%	35	64.76%	68.57%	[0.009[a]]	
Divestment timing	≥ 2.86%	35	60.82%	70.21%	0.062[c]	0.004
	< 2.86%	35	35.37%	33.73%	[0.058[c]]	
Total timing	≥ 191.29%	35	30.62%	16.06%	0.011[b]	0
	< 191.29%	35	64.50%	73.61%	[0.01[a]]	
Age	≥ 4	37	44.95%	46.96%	0.686	0.693
	< 4	33	50.48%	64.51%	[0.681]	
#funds	≥ 2	41	39.51%	44.73%	0.181	0.693
	< 2	29	58.94%	58.94%	[0.151]	

a – significant at the 1% level, b – significant at the 5% level, c – significant at the 10% level

Figure 4 – Univariate mean IRR comparisons

21 We did not compare means with respect to the real cash inflow to the funds due to the inability to differentiate between VC or buyout commitments in an overall IRR mean comparison with one cutting value.

22 In a further analysis we test the results for robustness by including all explanatory variables in one regression. The results confirm the findings of the former analysis. Investment timing ability does positively influence fund performance, at 5 per cent level of significance. Due to differences in venture capital and BO performance, we control for investment stage focus, and find that VC-funds have higher returns.

	Investment timing			Divestment timing			Total timing		
	IRR	IRR (test for multicollinearity)		IRR	IRR (test for multicollinearity)		IRR	IRR (test for multicollinearity)	
Constant	-0.373	-0.238	0.417[a]	-0.385	-0.313	0.439[a]	0.537	0.621	1.352[a]
	0.515	0.673	0.000	0.513	0.588	0.000	0.429	0.638	0.001
Investment timing	-0.538[c]	-0.495[c]	-0.540[c]						
	0.053	0.073	0.054						
Divestment timing				0.313	0.307	0.297			
				0.263	0.271	0.291			
Total timing							-0.479[b]	-0.452[b]	-0.470[b]
							0.020	0.027	0.023
Age	-0.0096		-0.007	-0.0068		-0.004	-0.00957		-0.007
	0.230		0.372	0.449		0.637	0.224		0.379
# funds	0.027	0.012	0.027	0.019	0.009	0.019	0.0225	0.0083	0.022
	0.165	0.476	0.215	0.395	0.612	0.401	0.287	0.689	0.299
Log (real fund inflows_ same vintage year)	0.184	0.146		0.192	0.170		0.193	0.155	
	0.165	0.256		0.160	0.199		0.139	0.222	
R squared	0.071	0.078	0.071	0.062	0.053	0.031	0.122	0.102	0.092
Adj. R squared	0.043	0.036	0.028	0.002	0.009	0.014	0.067	0.060	0.05
p-value (F-statistic)	0.148	0.148	0.184	0.397	0.32		0.076	0.071	0.098

a – significant at the 1% level, b – significant at the 5% level, c – significant at the 10% level

Figure 5 – Market timing and fund performance (full sample)

	Investment timing			Divestment timing			Total timing		
	IRR	IRR (test for multicollinearity)		IRR	IRR (test for multicollinearity)		IRR	IRR (test for multicollinearity)	
Constant	-2.099	-1.640	0.867[a]	-1.758	-1.431	1.031[a]	-0.949	-0.547	1.938[c]
	0.267	0.338	0.009	0.395	0.440	0.006	0.647	0.781	0.052
Investment timing	-1.290[c]	-1.250[c]	-1.236[c]						
	0.071	0.074	0.094						
Divestment timing				-0.0405	-0.0909	-0.101			
				0.947	0.876	0.871			
Total timing							-0.624	-0.535	-0.546
							0.233	0.284	0.309
Age	-0.0258		-0.002	-0.0181		0.005	-0.0314		-0.006
	0.523		0.956	0.686		0.914	0.471		0.881
# funds	-0.093	-0.146	-0.11	-0.167	-0.219[c]	-0.184	-0.0898	-0.184	-0.113
	0.568	0.146	0.517	0.352	0.077	0.317	0.613	0.132	0.538
Log (real fund inflows_ same vintage year)	0.673	0.575		0.632	0.564		0.687	0.567	
	0.119	0.143		0.179	0.186		0.613	0.171	
R squared	0.325	0.310	0.225	0.188	0.180	0.1	0.251	0.229	0.147
Adj. R squared	0.179	0.201	0.103	0.008	0.051	0.042	0.085	0.107	0.013
p-value (F-statistic)	0.114	0.065	0.174	0.413	0.275	0.563	0.241	0.167	0.375

a – significant at the 1% level, b – significant at the 5% level, c – significant at the 10% level

Figure 6 – Market timing and fund performance (VC sample)

Analyzing the two subsets (VC-funds and BO-funds) separately, we find different results for the explanatory variables. In the case of venture capital, results outlined in Figure 6 show that deal investment timing have a significant influence on fund performance. None of our control variables were able to explain the variations in fund performance. VC-backed companies are very immature at the time of investment. Due to difficulties in determining the true business value, investment prices are often subject to market valuation levels. The elasticity of company valuation to variation in market prices can be assumed to be higher than those of more mature companies. On the other hand, private equity fund managers find it easier to value more mature businesses according to real operating profits, and thus more independently from current market valuations.

We thus interpret our findings in accordance with the following arguments. To time favorable market valuations is essential for investing venture capital into immature companies, due to the high valuation elasticity to market prices. However, exit timing in accordance with high valuation levels is not as essential for performance. Exit prices are rather determined by real operating variables and corporate-specific quality of the business model. Of course, during the years of the technology bubble, selling VC-backed internet companies was pushing performance extraordinarily. In this situation, prices were not determined by real operating variables but on wrong future estimates of overoptimistic buyers. Nevertheless, one cannot claim this to be a common situation for private equity funds. In this paper we analyze data over a period of more than 20 years and test for relative valuation levels. Therefore, lots of ups and downs in market valuations are included in our sample[23].

For later-staged buyout funds our analysis reveals that fund performance is not driven by market timing but is significantly related to the experience of the individual fund manager. Figure 7 presents the results of an OLS regression testing the impact of market timing and experience [proxied by age of the private equity firm (age) and the number of previ-

	Investment timing			Divestment timing			Total timing		
	IRR	IRR (test for multicollinearity)		IRR	IRR (test for multicollinearity)		IRR	IRR (test for multicollinearity)	
Constant	0.130	0.168	0.289[a]	0.0383	0.31[a]	0.31[a]	0.596	0.615[b]	0.803[b]
	0.772	0.700	0.000	0.933	0.000	0.000	0.280	0.261	0.025
Investment timing	-0.208	-0.192	-0.215						
	0.365	0.394	0.345						
Divestment timing				0.295	0.294	0.272			
				0.275	0.271	0.305			
Total timing							-0.257	-0.243	-0.254
							0.147	0.162	0.148
Age	-0.00277		-0.002	0.00073		0.000	-0.00319		-0.003
	0.634		0.682	0.910		0.999	0.577		0.647
# funds	0.0327[b]	0.0284[b]	0.03249[b]	0.0252	0.0242[c]	0.026[c]	0.0294[c]	0.0252[b]	0.0296[b]
	0.037	0.028	0.034	0.118	0.07	0.10	0.052	0.051	0.049
Log (real fund inflows- same vintage year)	0.038	0.02677		0.0647	0.0624		0.0507	0.0368	
	0.717	.792		.544	.546		0 .623	.711	
R squared	0.137	0.132	0.134	0.148	0.148	0.14	0.164	0.158	0.159
Adj. R squared	0.053	0.07	0.072	0.063	0.085	0.077	0.082	0.097	0.099
p-value (Fstatistic)	0.186	0.110	0.106	0.161	0.085	0.1	0.111	0.063	0.025

a – significant at the 1% level, b – significant at the 5% level, c – significant at the 10% level

Figure 7 – Market timing and fund performance (BO sample)

23 A further analysis with proxies for investment and divestment timing included in one regression confirm the results. The investment timing proxy explains the performance at a 10% level of significance. This analysis is available on request.

ously managed funds (#fund)] on the performance of buyout funds. We find that more experienced fund managers, who have already raised some funds in their investment track record, perform better. This is confirmed on a 5 or 10 percent level of significance[24]. Thus, for successful investing into more mature portfolio companies, getting access to better deal flow and managing the investment seem to have a greater influence on the success of these investments than timing the market. This is in line with our hypothesis, that market valuation is less important in determining the investment success of real operating mature companies. Buyout investments are mature by definition, and therefore, prices paid rather depend on the companies' quality, which is easier to evaluate than for start-ups. Moreover, in order to achieve high returns it seems to be the investment managers' task of selecting high quality companies. Summarizing, experience and access to deal flow are essential.

One could argue that the differences in investment timing ability of BO funds are in some way related to the nature of venture capital and buyout investments, since bad months result in both lower NASDAQ prices and revenue shortfalls for new companies. On the one hand, since fund managers would lose everything, if they do not support portfolio companies (VC) during shortfalls, they are forced to provide capital inflows during bad months. On the other hand, one would expect that mature businesses (BOs) would be prone to this effect, if they have managed to save some cash as a buffer during downswings. Regarding the VC investments, ownership stakes in VC-backed companies are increasing, if capital is spent in several forced follow-on rounds with low valuations. As a result, the investment manager can afford to take out more during realization periods, even if the exit window opens later. This effect can be seen as a kind of unintended market timing within periods of low market valuations (resulting in higher IRRs). However, in those times fund managers usually concentrate on a few promising investments which are even financed through downswings. All the investments which show the slightest weaknesses in their business models are written off. We, therefore, do not expect a large impact of unintended timing (which should be seen next to the real timing ability) on the performance of VC funds. In any case, the results in Figure 3 confirm this expectation; because no significant differences in overall investment timing ability between VC and BO funds could be found (average and median investment timing abilities of all sample fund managers are differently favorable). Moreover, our analysis focuses on the question of whether investment timing ability influences fund performance, and not what the reasons for good and bad timing are.

Another alternative explanation, which could be discussed in this context, is sort of a natural timing due to milestone investing. We do not expect any large dilution of intended investment timing ability, since every financing round is evaluated separately and financing tranches could be withheld or released, if valuation levels do not appear to be fair. The same could be said for the impact of lock-up expirations within the realization period. Our dataset delivers information about the real cash inflows to the funds received from realized stocks of VC companies after the IPO. In the case of an IPO exit, we measure the divestment timing via stock sales. We assume that every fund manager is aware of all selling-restrictions and can anticipate those before he is making his particular exit decision.

Generally, in accordance with Ljungqvist and Richardson (2003a) we identify two important factors which determine fund performance. To time the market is essential for VCs, who invest into immature companies without a long business history. Due to the lack of company information, valuations seem to be highly related to the overall market valuations. For more mature companies market valuations seem to play a minor role. Here, the real quality of the business is essential. Consequently, in the case of buyout financing, experience of dealing with those investments, as well as the right access to higher-quality deals, is determining investment performance.

24 This result is also tested for robustness by including both the investment and the divestment timing in one regression to test for joined influence. # of funds is also significant at a 10% level.

Conclusion

This paper contains the first examination of market timing ability of private equity fund managers, using a unique set of detailed cash-flow data. In the field of public market portfolio management it is common practice to break down portfolio performance into two components namely, security selection and market timing. For private equity funds, portfolio performance has not been split up between the contributions of company selection and market timing so far.

As an important step towards a more comprehensive understanding of all components that affect the overall fund performance of private equity funds, we analyze whether private equity funds time the market, and also, whether there is a relationship between positive market timing ability and overall fund performance. Due to the special characteristics of private equity, market timing abilities are separately analyzed for the investment and for the divestment phase.

Our results demonstrate that investment timing has an impact on the performance of venture capital funds. Surprisingly, divestment timing has, on average, no such impact on returns, even after accounting for the bubble period of 1998-2000. For later-staged buyout funds, our analysis reveals that fund performance is not driven by market timing but rather significantly related to the experience of the individual fund manager. Thus, for successful investing into more mature portfolio companies, getting access to better deal flow and managing the investment affect the resulting success of these investments.

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