

The Performance of Leveraged Buyout Investments

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Abstract

Using a dataset containing performance information for nearly 6,000 leveraged buyout investments, we study the performance of buyout investments. We find strong evidence of persistence which we decompose. All of the persistence of experienced firms that are winners comes from their superior market timing abilities and for having a lower workload than other firms. Persistence is concentrated among winners and we show that winners do not take on any extra risk, neither idiosyncratic nor systematic, and if anything, take on less risk than other firms. Persistence, however, weakens if we focus on realized investments and we note a large volatility both among winners and losers. Performance is overall close to that of the public stock markets and star firms do not offer superior performance. The best ex-ante predictor of performance appears to be the busyness of the buyout organization (number of investments run in parallel).

The amount of fundraising and investment activity in the buy-out industry is currently at record high levels. These amounts are economically sizeable and affect both the way industries are restructured and the working of financial markets (e.g. the M&A market). Policy makers, investors and academics alike need to know more about this opaque industry. This paper attempts to bridge the gap between this widespread focus on leveraged buyouts and the dearth of large sample empirical evidence.

One of the most striking facts from previous research is the finding that the final performance of a private equity fund is related to the final performance of the private equity fund previously raised by the same firm (Kaplan and Schoar, 2005, KS). They find strong evidence among venture capital funds and mild evidence for buyout funds but less data, hence potentially less power, may explain the lesser strength on the buyout side. The depth of our dataset enables us to gain insight into this phenomenon on the buyout side.

We use a unique and comprehensive sample containing the gross of fees performance and characteristics of 5,965 buyout investments made by 193 private equity firms in 38 countries from 1973 to 2006. The value weighted multiple of these investments is 2.3. Hence, buyout firms have returned a bit more than twice the money invested before fees. After applying a number of filters aimed at reducing sample biases and insuring we have sufficient information, we obtain our working sample which is made of 3560 investments.

The overall gross-of-fees performance is relatively low. IRR averages 21% and multiple averages 2.7 while the average duration of an investment is 4.5 years. Median IRR and multiple are respectively 21% and 1.9. We use the same performance measure as in Ljunqvist, Richardson and Wolfenzon (2007) and label it 'return'. This is a lower bound for true performance which we cannot compute here because we do not know the timing of intermediate cash flows (see Phalippou and Gottschalg, 2007, for a study of performance level in the buyout industry). Average return is 7% and median return is 17% and returns are widely dispersed and beta is slightly above 1. Performance has been particularly high in countries like Sweden, the Netherlands and Italy and low in countries like Germany and Italy.

We find that poorly performing firms have similar chances to end up in top or

bottom performers on their subsequent investments. For top performers, however, past performance is a strong predictor of future performance. We decompose this persistence effect and find that a quarter is due to public market timing abilities and a quarter is due to a lower work load (they are less busy). However, these two channels explain entirely the persistence effect for experienced/large/old firms while it explains little of the persistence effect for the other firms. We also show that persistence is not achieved by different risk attitudes. Winners do not seem to offer any extra systematic nor total risk.

We find that persistence also weakens as we remove some investments in the track record. For example if we look only at the last five years or skip the last year and p-value for past performance goes down to 10% when looking only at the performance of past investments that are liquidated at the time of the investment of interest.

We also find that the work-load/busy-ness of the firm is significantly related to performance. The inter-quartile range in busy-ness is 3 to 10 investments in a year and predicts a performance spread of 8.4% p.a.

The widely held belief that firms with long track records and a lot of experience are good investments appears incorrect. The performance of ‘star’ firms is similar to that of others. They may be refusing capital because they do not want their performance to drop below average. Hence the puzzle seems to be more on ‘why investors think star firm are superior investment opportunities’ rather than ‘why star buyout firms refuse capital’.

The paper proceeds as follows. Section 2 provides background information, describes the data source and sample selection. Section 3 is dedicated to the performance of buyout investments. Section 4 analyses performance persistence and section 5 concludes.

2. Data

2.1. Institutional background

Buyout firms (e.g. KKR and Blackstone) are run by General Partners (GPs). GPs have control over all important decisions (e.g. investments, divestments, operational changes) for virtually all the funds managed by the buyout firm. Funds are closed end funds with typically a finite life of ten years, which can be extended to fourteen. At each point in time a firm may have one or several funds running. In most cases, buyout firms launch a new fund every two to four years. Investors in buyout funds are principally institutional investors such as endowments and pension funds. These investors, called Limited Partners (LPs), commit a certain amount of capital to buyout funds at inception. LPs cannot add capital during fund's life. Both withdrawing capital and selling stakes to another investor is possible only at very high cost, although nowadays a secondary market for stakes in buyout funds is developing. When buyout firms raise a new fund, they send Private Placement Memoranda (PPMs) with the track record of the investments made by the funds currently and previously managed.

2.2. Data source

Our primary data source is hand-collected audited track records of buyout firms reported in PPMs.¹ Our collaborating investors are based in both Europe and the US and gave us PPMs irrespective of their final investment decisions. We often receive the same PPM from different sources and combined them to get the maximum information possible (the amount of information provided by different partners differs; for example, some hid the name of the portfolio companies and others did not).

Our dataset is a unique and proprietary collection of 5,867 investments made by 191 buyout firms in 38 countries made between 1973 and 2006 for an equity value of \$262 billion. In Table 1, we compare the coverage of our initial dataset to that of Thomson Venture Economics (TVE) from 1981 to 2003. We have 5,513 investments for

¹ If a firm provides a track record where all its previous investments are pooled together without information on which fund did which and less than 75% of the investments are LBOs, the firm is excluded. If a firm reports the performance for each of its funds separately then we exclude only the funds with less than 75% of LBO investments.

a value of \$223 billion versus 4156 investments for a value of \$210 billion in TVE.² Our coverage is thus slightly superior to that of TVE, but it is known that TVE does not capture the universe of buyout as well as they do for venture capital. We can also compare part of our sample to that of Ljungqvist, Richardson and Wolfenson (2007) as they have a similar dataset. They have 2274 buyout investments between 1981 and 2003, which is about 40% of our sample for that time period.³

In terms of sample bias for performance, on the one hand, only firms with good track records will send fund raising prospectuses during our collection period. However, our collection period started in 2001 and we do not know of any major buyout firm that stopped fund raising following poor performance but some smaller organizations probably have. On the other hand, we do not have some large buyout firms. As large firms tend to have superior track records, we presumably understate performance. In Table A.1, we generate a list of buyout firms that have more than \$10 billion of asset under management from TVE. They are 25 such firms. In our dataset, we have 20 of these firms and the one missing are mainly those that are not classified as ‘private equity firm investing own capital’. So we could expect a slight bias towards losers via this channel. Overall, we think we have a slight upward bias in performance.⁴

In the PPMs, we observe the list of the investments made by each buyout firm. For each investment, we have the equity invested and the total amount distributed plus the current valuation of the un-sold stakes (at the date the PPM was written). The corresponding multiple (current valuation divided by investment) for each investment is always reported. Extra information is provided in most PPMs but the extent varies from one PPM to the other. This extra information is: month and year of acquisition, IRR, month and year of exit, status (typically 2 categories: either partially & fully realized or unrealized), current valuation broken down in the total cash distributed and the current valuation. Less frequently reported is information about the exit route, the investment type, the industry and the country. In Appendix A and Table A.2, we provide details on

² In TVE we restricted the search to “private equity firms managing their own capital”, investment size above \$100,000, private equity fund focus and investment stage is buyout, so as to match our sample selection criteria.

³ Ljungqvist et al. (2007) observe fund level data, hence they report capital committed to buyout funds and compare to the corresponding TVE figure, which is higher than the sum of investments reported by TVE.

⁴ Our confidentiality agreements always prevent us for naming a buyout firm in our sample. We cannot,

the frequency of missing information on duration and IRR as well as certain extrapolations we do to avoid biasing the sample.

Most of our PPMs are anonymous in that they do not show the name of the firm. They nonetheless give often information such as asset under management, foundation year and the biographies of the partners. The name of the portfolio companies (corresponding to each investment) is also often provided although some collaborating investors hid portfolio company (PC) names, some of our collaborating investors provided us with case studies for some investments. Such case studies are part of the fund-raising package. From these case studies, we have information on the dates, industry, country, exit route, the ‘investment thesis/rationale’ and the ‘strategy implemented’. When the name of the PC is known, we use Thomson Venture Expert (TVE) and web resources to complement our data. When neither country nor PC name is known, we set all PC countries to that of the buyout firm regional focus (e.g. US, UK, Europe).

Investment industry descriptions are manually assigned (except if we have the SIC classification from TVE) to one of the 48 Fama-French industries and we further group them into 12 industries (see Table A.3). Each has more than 100 investments. Most frequent industry is services (tertiary sector) then industrial (secondary sector), in which we group many industries such as chemicals, machinery, manufacturing, textile, etc.

Our performance data have the additional advantage of being audited rather than self-reported. Part of the performance of not fully realized investments is, however, a self reported, although audited, accounting valuation. Importantly, buyout firms need to disclose all the investments they made including the bad ones. As a consequence, our sample contains numerous poorly performing investments. A final remark is that for about one third of the investments, we know which firm did them but not which fund (due to pooled track records). That is why our analysis will be at the buyout firm level. Nonetheless, in the buyout industry, funds are supervised by the same team (General Partners) and it thus makes sense to study performance persistence at the firm level.

therefore, give the list (in full or in part) of buyout firms in our sample.

2.3. Sample selection

We eliminate investments without an acquisition year (292 cases, 5.7% of total size and average multiple is 2.35). Next, we eliminate firms with less than 10 investments (243 cases, 3.2% of total size and average multiple is 2.31). Next, we eliminate the investments made in the 3 years before the date at which the PPM is written (1622 cases, 35% of total size and average multiple is 1.53). These investments are too young for their performance to be representative. 643 of these investments (about half of these young investments in terms of size) are held at cost (i.e. their valuations are set to the amount invested) and is thus incorrect. Overall, these young investments have low performance mainly because of conservative accounting in the early years of the investments. Finally, we eliminate the investments made by GPs when they were working for another buyout firm (235 cases, 2% of total size and average multiple is 2.72).⁵

In the end, we have 3560 investments in our final dataset, which we label our working sample. Their average multiple is 2.70.

3. Performance of LBO investments

3.1. Performance Measures

As mentioned above, we always have a multiple as a measure of performance and sometimes an IRR. Both measures have drawbacks. IRR suffers from the re-investment hypothesis while multiple does not take into account the timing of cash flows. In a similar context, Ljungqvist, Richardson and Wolfenson (2007) use $\text{multiple}^{(1/\text{simple_duration})}$; we label it “Return” for simplicity and use this measure for the main analysis. This measure takes into account investment duration but implicitly assumes that cash flows are re-invested at 0%, which underestimates performance. Below, we also show results with the other two measures.

For each performance measure, we observe a long right hand side tail in the distribution. IRRs above 500% per year or multiples above 20 are relatively common

⁵ Many prospectuses include in the track record of a given firm some selected investments made by the partners when they were working for another firm. As the selection of the investments is potentially arbitrary (the statement ‘involved in an investment’ being flexible) including these would bias performance figures. They would also bias our perception of performance persistence since these investments were made in another firm. Note also that most of these investments are eliminated when we erase firms for which with have less than 10 investments.

(1.7% and 1.9%) although they concentrate in smaller deals (they represent 0.9% and 0.6% value weighted). When computing track records and conducting regression analysis, we winsorize each performance figure at its 95th percentile. For multiple, this threshold is 11, while for IRR and Return it is 190% and 137% respectively (Table 2 – Panel A). For the same reason, we winsorize duration and size as they are used as weights and can take extreme values. Their 95th percentile is 8.7 years and \$164 million.

The distribution of the three performance measures is shown in Figure 1. The distribution is close to symmetric for IRR and Return while closer to log-normal for multiple. Hence, we always work with $\log(1+\text{multiple})$ when using multiple. The correlation between the three performance measures is very high (Table 2 – Panel A); it is 95% between IRR and return, 85% between multiple and return and 82% between IRR and multiple. Performance is also highly correlated with duration, except when measured with multiple (-40% for return and -10% for multiple). We also show that it is not due to conservative accounting as the relation is even stronger for fully liquidated investments. This fact is also found by Phalippou and Gottschalg (2007) at the fund level and, as they recommend, we time value weight performance when measured by IRR or return. Hence, an investment of \$100 that lasts for four years receives twice the weight as an investment of \$100 that lasts for two years. Because of the large negative correlation, this correction has a large impact on overall performance.

The distribution of performance is wide. A quarter of the investments have a negative return and a negative IRR. More than a quarter lose money (multiple is below 0.88 for bottom quartile). Top quartile investments, in contrast, have returns above 42%, IRRs above 52% and multiples above 3.5. For fully liquidated investments, the dispersion is even wider. For example, top quartile investments return more than 56% per annum while bottom quartile investments return less than 2% p.a.

3.2. Descriptive Statistics

3.2.1. Explanatory variables

We describe below the variables we construct and use. Descriptive statistics and a correlation matrix are shown in Table 2 – Panel B.

First, we use the sequence number of the investment in the firm track record to capture firm cumulated experience as in KS (sequence). The inter-quartile range is 7 to 45. Second, we measure equity under management (EUM), which is the amount of investments that are not exited (cost basis). This is an important variable in light of a trend towards concentration in the industry (it was recently reported in financial press that half of the deals done in 2006 involved KKR). The inter-quartile range is \$77 million to \$735 million. This variable is highly related to sequence (correlation is 73%) but captures more directly economies or diseconomies of scale (Stein, 2002). This variable may also capture how busy the organization is. However, we think that a more direct measure is the number of deals made over the previous 12 months. When deals are concentrated in a given period of time it means that both the time dedicated to the purchase due diligence and to the monitoring have to be shared across more investments. Hence, our third variable – organization ‘busy-ness’ – may affect negatively performance in a similar way as busy boards have been recently shown to be counter productive (Fich and Shivdasani, 2006). The correlation between EUM and Busy-ness is only 37% but the correlation with sequence is as much as 67%. The inter-quartile range is 3 to 10 and the top 5% busiest do more than 24 investments over a year.

Fourth is investment size. The distribution of investment size is interesting. 25% of the investments are less than \$5 million and the median is \$14 million. Hence most of the investments are relatively small. Only 5% of the investments are above \$164 million (Table 2 – Panel A). Hence the ability to invest in large companies for which there is little competition from other buyout firms could be a competitive advantage for large firms and a source of performance persistence. Only large firms can invest such large amounts of money in a single investment because there is usually a cap at 10% of fund size for any single investment. Consistent with this, the correlation between EUM and investment size is 61%. Fifth is firm age at the time of the investment, which is also a proxy for experience and, thus unsurprisingly has a 67% correlation with sequence and

58% correlation with EUM. The inter-quartile range is 2 years to 9 years. The distribution of these 5 variables is highly skewed (see percentiles in Table 2 – Panel B) and we thus always work with their log-transform.

Sixth is the variable of interest: past performance. We construct the performance achieved by all investments made before the deal of interest and, as discussed above, time value weight each (winsorized) return to obtain past performance. It is already interesting to note that past winners at time t are firms that are less busy and have less equity under management at time t (correlations are -24% and -35%). Also, past performance deteriorates with investment sequence (correlation is -36%) and a bit with the age of the firms (correlation is -13%). Hence performance tends to be lower later in a firm's track record.

Seventh is a proxy for the supply of capital in the buyout industry. As in KS, we use the log of the number of deals made in a given year according to our full sample. The motivation is the study by Gompers and Lerner (2000) that show a negative effect on purchase prices in the venture capital industry of the 'amount of money chasing deals'.

Eighth are risk/style factors. We use the three factors of Fama and French (1993): stock market premium, SMB and HML (from Kenneth French website). We note that the average market return during the life of the investment is 12% p.a. and the median is 14% p.a. Over our time period (1971-2006) the average market return is 12%, hence overall buyout firms do not invest more during high public stock market returns. We compute the average value of these factors during the life of each investment. In addition, as LBO investments require the issuance of substantial amounts of debt, the credit spread at the time of the investment may influence return. On the one hand, low credit spread could lead to higher returns because it lowers cost of debt. On the other hand, when credit spread is low, Axelson, Jenkinson, Stromberg and Weisbach (2007) show that transaction prices are higher, hence returns could be lower. Axelson et al. (2007) also find that over recent years there is a strong relation between amount invested and credit spreads. This is confirmed in our data. The correlation between credit spread and supply of capital in the buyout industry is -80%. Credit spread also influences the number of investments at the firm level as busy-ness increases when credit spread decreases (-18% correlation). We also note that busy-ness is negatively correlated with public market returns showing that

times at which buyout firms make a lot of investments precedes low public market performance.

Finally, we add a dummy variable that takes the value 1 if the investment is in a US company and add dummy variables for each industry.

3.2.2. Performance

Table 3 presents descriptive statistics on performance (gross of fees). We break down these statistics per liquidation status and exit route in Panel A, per country in Panel B, and per industry in Panel C.

Median return is 17% and median IRR is 21%. Average (time value weighted) IRR is also 21% but average (time value weighted) return drops to 9%. This shows that some early cash distributions are responsible for several large IRRs. The true return is between the two as the re-investment rate is between 0% and 21%. We nonetheless note that even in the best case scenario, the return would be 21% gross of fees and hence about 15% net of fees (see Phalippou, 2007), which is in the range of public equity performance over the last 25 years.⁶ The multiple has a median of 1.9 and a value weighted average of 2.7. Half of the successful exits are via IPO (the rest are trade sales, merger, ..., and are labeled 'sale') and the average duration of an investment is four years and a half.

The sub-sample of fully liquidated investments has a higher performance, but one should bear in mind that there is a strong negative correlation between performance and duration and thus best investments are exited more quickly creating a positive bias in performance when selecting fully liquidated investments.

We also define a sub-sample of star firms. These firms have a track record that spans more than 10 years and they invested more than \$1 billion. We count 27 such firms. They include most of the firms listed in Table A.1 and a few additional famous buyout firms. They represent half of the investments in our sample, which confirms the belief that the buyout industry is very concentrated. A few large firms do most of the investments. Surprisingly, these firms do not have superior performance. Their average

⁶ Note that our data do not allow us to compare precisely performance to that of public stock-market benchmarks and we refer to Phalippou and Gottschalg (2007) for such a study. An average IRR cannot be compared to the average return of a benchmark over the same time period. Importantly, we note that our results here appear consistent with that of Phalippou and Gottschalg (2007).

performance is about the same as the average performance of the entire sample. We then separate their investments between those they did earlier on in their life (before they were 8 years old; the median age for star firms) and those they did later. We find that their performance was better in their earlier years but it is significantly above average. The average multiple of these early investments by star firms is 2.9 (versus 2.7 sample average) but the duration was longer and both their average IRR and average return is the same as the sample average. This result is also important for our sample bias discussion above. If large firms do not have a different return than other firms, then the fact that we are missing 5 large buyout firms may not bias our sample downward for performance. It is then likely as mentioned above that if there is a bias, it is towards better performing firms.

The investments successfully exited have superior performance, especially those exited via an IPO. This fact is well established for venture capital but it was not obvious whether it was true for buyouts. Also, its magnitude was unknown: a buyout investment exited via an IPO has twice the performance of the average investment. We also note that IPO exited investments last longer on average but this is due to the fact that buyout firms hold a stake in the company that goes public, hence the duration of such investments is longer.

In Panel B, we show the statistics per country. In terms of number of investments, the US is about half of our sample (55%) but in terms of invested amounts, it is almost three quarter (73%). Over our sample period, virtually all large buyouts are made in the US. This situation is however currently changing as some large deals happened recently in Europe. The UK dominates the rest of the world. It has about 4 times as many investments as the third largest country (France) and almost 8 times as many as the fourth and fifth largest countries (Sweden and Germany). In terms of amount invested, however, Germany and France are equal and are the third largest countries.⁷

In terms of performance, Germany and the UK appear consistently to be the worse performing countries. Their average multiple is 2.2 and 2.1, average IRR is 17%

⁷ We have relatively few deals from Canada but this could be because many Canadian deals may be classified as North American, which we classified as US or if the firm is focused on the US but does not state PC countries, we then set all the PC countries to US. These firms, however, do some investments in Canada.

and 10%, and average return is -2% and 9% (because German investments last longer than UK investments). At the other side of the spectrum, the Netherlands, Sweden and Italy appear as the best performers. Their average multiple is 5.4, 3.1 and 3.0, average IRR is 47%, 41% and 37%, and average return is 21%, 33% and 18% (Italian investments are those lasting the longest at 5.3 years on average, hence their returns are closer to the average). When looking at median performance, it is Sweden that has the highest. The Netherlands has a few large investments with very high performance but the median investment is close to the sample median in terms of both return and IRR and has actually the worse median multiple of all countries. We have 8 countries in the working sample that can be classified as developing countries. These are Argentina, Brazil, Chile, China, Indonesia, Korea, Mexico and Poland. There are only 21 investments made in these countries but their total size is relatively large (as much as Italy) and their performance is lower than average. Finally, we note large difference across countries in terms of IPO exits versus other sales. Spain, Germany and the Netherlands have high fractions of IPO exits while Italy and Sweden have little (10% and 25% respectively). This shows that counting IPO exits as a measure of success may be good within a country but get noisier when used for international studies.

In Panel C, we show the statistics per industry. Overall, high performing industries are High-tech and Finance while consumer goods (household) and natural resources lag behind. The food industry has high multiple and high median returns but is penalized by a number of poorly performing investments that are held for a longer period. The industry with longest holding period is natural resources (5.25 years) while high-tech has the shortest one (4 years). Also, high-tech along with wholesale and leisure have low IPO exits while natural resources have a high fraction of IPO exits.

4. Performance persistence

We investigate performance persistence. We start by constructing a performance transition matrix. Namely, we analyze the probability of having an investment in a given return quartile conditional on the firm track record being in a given quartile. Next we perform a regression analysis which shows part of the drivers of the consistent performance.

4.1. A first look at persistence: Transition matrix

We have a first look at persistence by analyzing at the probability that a winner/loser stays a winner/loser over time. Specifically, in Table 4, we show the probability of having an investment in a given return quartile conditional on the firm track record being in a given quartile. We see that poor track records do not predict well future performance while good track records do. A firm with a bottom quartile track record has almost equal chances to generate a top quartile or a bottom quartile investment. A firm with a top quartile track record has twice as much chance to have its investment in the top quartile as it has to have it in a bottom quartile. The exact magnitude depends, however, on the threshold for top quartile performance. If we time value weight observations, then a top quartile investment is when it is above 28% (versus 42% when equally weighted). In Panel B, we find that in the time value weighted case, a firm with a top quartile track record has three times as much chance to have its investment in the top quartile as it has to have it in a bottom quartile. The bottom quartile firm has, here as well, equal chances to be in the top or bottom quartile.

It appears that persistence is concentrated on winners and not on losers. The puzzle is then to understand why winners are consistent winners and why they do not increase their size or fees until such persistence is erased. To answer these questions, we turn to a regression analysis.

4.2. Unconditional Regression Analysis

We begin by performing White's adjusted heteroscedastic consistent least-squares regressions to study the determinants of performance. The dependent variable is return on a given investment and the independent variables are as described above. Results are shown in Table 5.

When all the variables are in the specification, past performance is strongly significant both statistically (1% level test) and economically. A spread in past performance of 10% per year translates into an expected spread in performance of 2.2%. Part of persistence could be due to industry or country effects. Some firms focus on a given industry/country which may turn out to be a high return one or they may successfully time the right country or industry. We find no such evidence for the industry and some evidence for country. When country fixed effects are removed the effect of past performance increases slightly from 0.22 to 0.24.

When we remove the public stock market returns over the same period, the effect increases by 21% (from spec 5 to 6 and from spec 9 to spec 10). This is because past performance and the market factor are positively correlated (24%). It means that winners tend to invest when future market returns are higher. They thus show some public market timing abilities, which account for 21% of their superior expected performance.

Another important driver of persistence is busy-ness. Its effect is the same as that of the market (23% from spec 5 to spec 8). Equity Under Management has a similar effect although smaller (8% from spec 5 to spec 7). Winners tend to be less busy and have less equity under management and these two variables are highly related to performance. When an investment is made among many others in a given year, hence firm is busy, performance is significantly affected. Busy-ness is consistently significant at a 1% level test. Note also that busy-ness is measured without noise ex-ante and can be contracted on by investors. Also of interest, if busy-ness is in the specification along with closely related variables such as experience, it dominates. Also when the total amount (not the number) of investments done over the last year is in the specification, busy-ness dominates it despite high correlation (non-reported). Note that the strong negative correlation between experience and performance shown in Table 2, is purely driven by the fact that experienced firms tend to be busier and as such underperform.

When running a simple regression of performance on past performance (spec 10), we obtain the full effect of past performance which is that a spread in past performance of 10% per year translates into an expected spread in performance of 4%. The t-statistic is 9.

When looking at risk (spec 11), credit spread switch signs as a function of the set of control variables. It is positively related to performance when only risk factors are included. SMB and HML are not significant. Market risk has a coefficient of 1.3, which is a proxy for beta and is close to the beta found in Driessen, Lin and Phalippou (2007).

Note also the correlation between busy-ness and supply BO (+27%) meaning that in years with high supply of capital each firm is busier and because this hurts performance, part of the negative correlation between supply and returns comes from the busy-ness channel.

The fact that sequence is not related to performance and that EUM is negatively related to performance is consistent with buyout fund level results in Kaplan and Schoar (2005). They find strong positive relation between size and between performance and experience and performance for venture capital only. This shows the need to analyze the determinants of performance for buyout and venture capital separately.

Our explanatory variables explain half of the persistence phenomenon. About a quarter is due to market timing abilities and a quarter is due to the fact that winners have a lower work-load and less equity under management.

4.2. Conditional analysis

We now look at sub-samples of investments. We want to see whether the decomposition of persistence and its strength is different for some sub-categories of firms/investments.

Table 5 – Panel B shows the results for large and small firms (according to their EUM at the time of investment) separately, old and young, star and non-star and busy and non-busy, experienced and non-experienced. These categories overlap as old, large, star, busy and experienced firms tend to be the same ones but the overlap is not perfect.

Investments realized by large/old/experienced firms (at the time at which firms are large/old/experienced) do not exhibit any persistence when control variables are included. However, star firms have the same persistence as non star firms and busy firms have weaker persistence than non-busy firm but non-busy firm still exhibit significant

persistence at 10% level test. We also look at US and non-US investments separately and notice the same magnitude for persistence in both.

In Panel C, we look more into the experienced versus non-experienced firms finding by decomposing persistence as we have done above. When running a simple regression, we observe that persistence is stronger economically for experienced firms although statistically it is slightly stronger for non-experienced firms. Interestingly, the market timing channel documented above is true only for experienced firms and is large for them. Experienced winner firms exhibit strong market timing abilities (26% correlation between past performance and future stock-market returns for experienced firms; non-tabulated) while non-experienced firms exhibit very little (11% correlation between past performance and future stock-market returns for non-experienced firms; non-tabulated). As a consequence, controlling for market returns decreases the effect of performance by half for experienced firms and leaves the effect virtually unchanged for non-experienced firms. The second channel that explains persistence is the workload/EUM effect found above. This also affects more experienced firms but the difference is not as large as with market timing. The correlation between busy-ness and past performance is similar for experienced and non-experienced firms. This second channel explains 30% of the persistence of the experienced firms but none of the persistence of non-experienced firms. Hence, the two channels reported above explain entirely the persistence of experienced/large/old firms while the persistence of non-experienced firms has little to do with these channels.⁸

⁸ In Panel D, we do the same exercise with large versus small firms. When running a simple regression, we observe that persistence is equally strong economically for large and small firms although statistically it is stronger for small firms. The market timing channel documented above is true only for large firms and is very large for them. Large winner firms exhibit strong market timing abilities (31% correlation between past performance and future stock-market returns for large firms; non-tabulated) while small firms exhibit very little (9% correlation between past performance and future stock-market returns for small firms; non-tabulated). As a consequence, controlling for market returns decreases the effect of performance by two thirds for large firms and leaves the effect virtually unchanged for small firms. The second channel that explains persistence is the workload/EUM effect found above. This affects more large firms but the difference is not as large as with market timing. For large firms, the correlation between busy-ness and past performance is -39% while for small firms it is -30%. This second channel explains about half of the persistence of the large firms and 20% of the persistence of small firms. These two effects are not additive because they are correlated and overall the two channels explain all of the persistence for large firms and 20% of the persistence among small firms.

Table 5 – Panel E shows time sub-samples. Persistence is present only in the early part of our sample (before 1995), but as above, the disappearance of persistence is due to the control variables. Note that investments made before 1995 by young firms have little systematic risk. Table 5 – Panel F shows persistence for the ‘star’ firms in the buyout industry. These firms are special as they are known to refuse a lot of capital from investors. In terms of persistence, it is found for all sub-samples except for the old non-star firms. Hence if a firm has not reach a large size after many years in business, then its past performance is not predictive of future performance.

Panel G shows different horizons for the track record and provides a first sense of whether persistence can be used to predict future return *ex-ante*. We show results with a track record that excludes the investments made over the previous year, a track record over the last 5 years and that excludes the investments made over the previous year and a track record made up of only the investments that are liquidated at the time of the investment of interest. The last one is thus the most restrictive but contains information that were known *ex-ante*.

As we remove more observations from the track record, the economic magnitude of persistence decreases quickly (except when we use only the last 5 years instead of the whole history). This result is obtained with and without control variables. When using only liquidated investments, the coefficient is only 0.05 (down from 0.40) but the standard error decreased by one third showing that there is less noise around the estimate than in the main specification.

Finally, in Panel H, we show that the results are the same when using other performance measures for the two main specifications. Interestingly, both persistence and busy-ness have a higher *t*-statistics when we use multiple. The IRR results are virtually the same as the results with return, which was expected given the 95% correlation between these two measures.

4.4. Within quartile regressions

Poorly performing firms may survive because their performance does not persist on average. One possibility is that they take on more risk to get back in the money and the relatively high likelihood to get into top quartile may be a result of this. To investigate this possibility and also to test whether consistent winners achieve that by taking on more risk, we run the same regression as above for each past performance quartile separately. We can then measure systematic risk within each quartile and also get a distribution, hence a total risk measure for each quartile.

Results are reported in Table 6. It confirms that after adding control variables, the only quartile where there is persistence is the winners. Past performance matters only for past winners. It means that if you have low past performance, it does not matter how low or high past performance is. For past winners, however, it matters a lot.

Also of interest, busy-ness and EUM negative effects are not present for winners and their loading on market returns is the lowest. The volatility of return is also lower for winners although the spread is not large compare to the other quartiles. Neither losers nor winners appear to take on extra risk. If anything, winners take on less risk and losers have about the same risk as the average investment.

5. Conclusion

In this paper we provide an extensive description of the performance characteristics of the buyout industry worldwide. We show that returns are widely dispersed, are on average in the range of public stock markets, and beta is slightly above 1. We find that poorly performing firms have similar chances to end up in top or bottom performers on their subsequent investments. For top performers, however, past performance is a strong predictor of future performance. We decompose this persistence effect and find that a quarter is due to public market timing abilities and a quarter is due to a lower work load (they are less busy). However, these two channels explain entirely the persistence effect for experienced/large/old firms while it explains little of the persistence effect for the other firms. We also show that persistence is not achieved by different risk attitudes. Winners do not seem to offer any extra systematic nor total risk.

We find that persistence also weakens as we remove some investments in the

track record. For example if we look only at the last five years or skip the last year and p-value for past performance goes down to 10% when looking only at the performance of past investments that are liquidated at the time of the investment of interest.

We also find that the work-load/busy-ness of the firm is significantly related to performance. The inter-quartile range in busy-ness is 3 to 10 investments in a year and predicts a performance spread of 8.4% p.a.

The widely held belief that firms with long track records and a lot of experience are good investments appears incorrect. The performance of ‘star’ firms is similar to that of others. They may be refusing capital because they do not want their performance to drop below average. Hence the puzzle seems to be more on ‘why investors think star firm are superior investment opportunities’ rather than ‘why star buyout firms refuse capital’.

The buyout industry is known for being a boom and burst industry with very pronounced cycles. One explanation could be that in some periods in time many investments are made (maybe because credit spreads are low or past performance of the industry has been good), firms are then very busy and under-perform, which in itself would reduce capital flows and then improve future prospects. Also, if credit spreads increase again then less investments are made, firms are less busy and future prospects are better.

Our study of persistence presents some limitations. The intuition in Berk and Green (2004) that as people learn, fund size should increase to eliminate performance persistence is difficult to test with our data as we do not have good fund level data nor intermediary performance information.

Also, as described above, past performance is the weighted track record of the firm. It is the final performance reached by all the investments in which the firm has invested in previously. This definition follows closely that of Kaplan and Schoar (2005). There is, therefore, overlap between investments for performance evaluation. Hence, the finding of persistence here does not mean that performance is predictable in real time. This question cannot be answered with our dataset.

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Appendix A: Details on data treatment

PPMs always contain a multiple for each investment and we have selected the PPMs that give an acquisition year for each investment. Two important variables are therefore sometimes missing: duration (difference between exit or valuation date and acquisition date in months) and IRR. Table A.2 shows the frequency of each missing information along with the average multiple in each case for those with missing information.

A. Missing duration⁹

There are 2,271 Investments with a complete duration representing half of the sample in terms of value invested. These investments have the same performance as the rest of the sample (their average multiple is 2.49 versus 2.56). For the investments missing a complete duration we proceed as follows. First, we sometimes have the ‘month’ missing but years are provided. This happens in 215 cases. We then assume the investment happened in June unless acquisition year and exit year are the same in which case we assume the acquisition month to be March and exit month to be September so that duration is 6 month. These investment tend to have lower performance (multiple is 1.84).

Second, if an investment does not have a complete duration but an IRR is reported, we deduct duration from the value of the IRR and multiple. The idea is to use the equation $(1+irr)^{duration} = multiple$. This equation holds only if they are no intermediate cash flows. Since there are intermediate cash-flows in practice, we run a simple OLS regression with $\log(multiple)$ divided by $\log(1+irr)$ as explanatory variable and duration as dependent variable for the sub-sample that has all valid data and get a good fit with an R-square of 65%. We then use this relation to deduct duration for the 679 observations that are in this case. These observations have a high multiple and their inferred duration is on average 4.40 years, which is very close to the average (4.56). The rest of the observations (395 cases) gets the average duration.

B. Missing IRR

When the multiple is 0, the IRR is always missing and we set it to -100%. When multiple is 1 and IRR is missing we set IRR to 0%. There are 2,882 cases with IRR provided (more than two third of the sample). These investments have superior performance as their multiple averages 3. Those with missing IRRs have multiples averaging 0.82 when duration is available and 0.82 when neither duration nor IRR is provided.

When duration and multiple is available (461 cases), we operate the same way as above. We find the relation between IRR and $multiple^{(1/duration)}-1$. The R-square is 85% and use this relation to deduct IRR for these 461 observations. The average IRR is -0.09. When duration is missing, we use the same extrapolation simply having average duration for duration and have an average IRR of -0.08% for these investments.

⁹ Note that duration should be in theory computed like for bonds, i.e. by computing the value weighted time of distributions minus that of investments where the weights are the present value of cash flows (this is fine as long as duration is positive). Because we do not have dates and amounts of intermediate cash flows we take the spread between exit/valuation date and acquisition date as duration.

Figure 1: Performance distribution

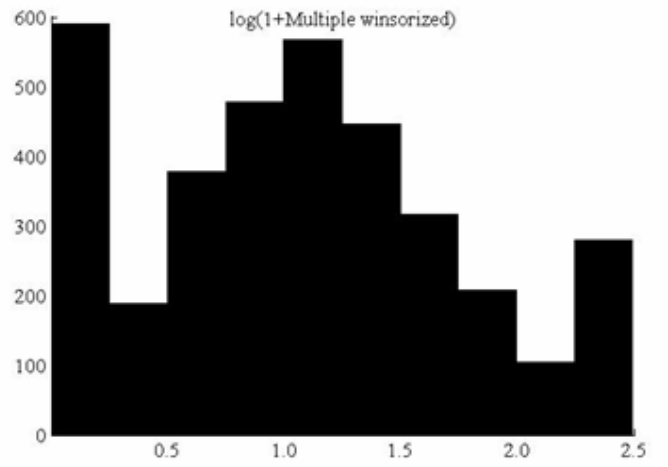
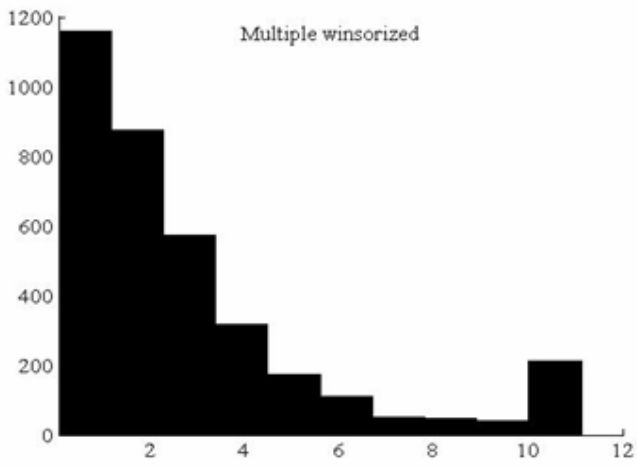
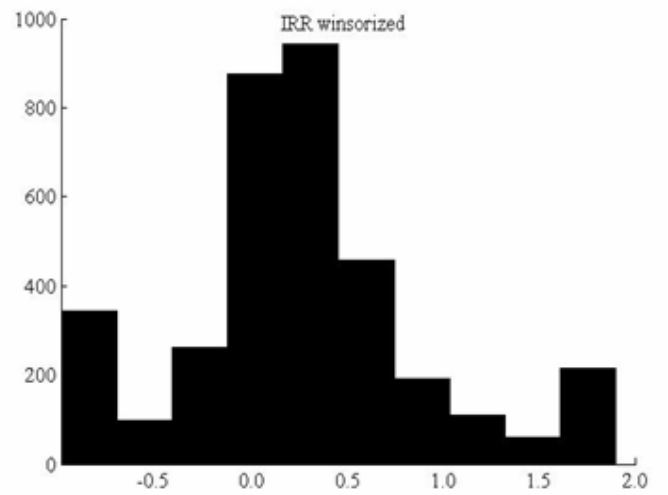
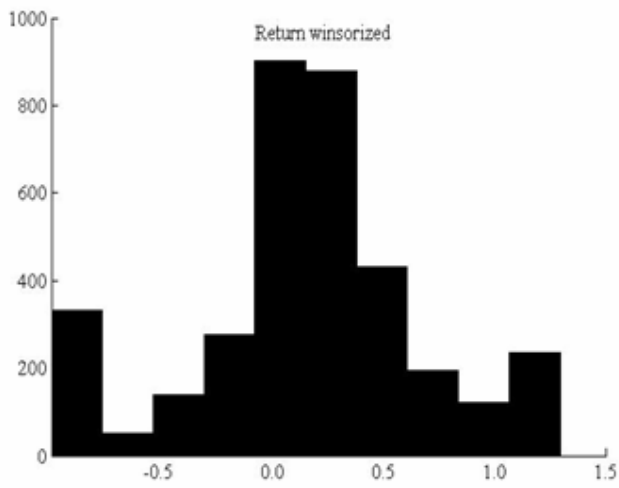


Table 1: Coverage

This table compares the coverage of our sample to that of Thomson Venture Economics (TVE) in terms of the number of deals and their corresponding total size each year. In TVE, we restrict the sample to private partnerships with a buyout investment focus and with deal size about \$100,000. Total size is expressed in 2006 dollars in both cases.

Year	Sample		Venture Expert		Coverage	
	N deals	Total size	N deals	Total size	N deals	Total size
≤ 1980	32	211	23	113	1.39	1.86
1981	19	845	16	487	1.19	1.74
1982	12	69	24	135	0.50	0.51
1983	22	426	39	529	0.56	0.81
1984	41	2,077	52	998	0.79	2.08
1985	52	1,602	63	890	0.83	1.80
1986	84	2,332	111	1,531	0.76	1.52
1987	79	1,905	85	1,167	0.93	1.63
1988	133	4,619	94	3,627	1.41	1.27
1989	117	10,945	100	8,196	1.17	1.34
1990	174	4,540	66	5,061	2.64	0.90
1991	194	5,507	50	2,026	3.88	2.72
1992	214	6,166	69	2,631	3.10	2.34
1993	236	6,864	74	2,158	3.19	3.18
1994	349	8,646	89	1,733	3.92	4.99
1995	347	13,037	140	3,757	2.48	3.47
1996	399	14,943	362	11,273	1.10	1.33
1997	499	20,416	298	10,555	1.67	1.93
1998	535	21,995	434	19,783	1.23	1.11
1999	685	31,180	450	25,506	1.52	1.22
2000	682	32,761	539	29,305	1.27	1.12
2001	293	11,355	391	17,566	0.75	0.65
2002	189	11,742	286	24,940	0.66	0.47
2003	158	8,921	324	35,778	0.49	0.25
2004	122	13,017	290	25,563	0.42	0.51
≥ 2005	173	18,600	NA	NA	NA	NA
Unknown	27	6,814	NA	NA	NA	NA
Total	5,867	261,533	NA	NA	NA	NA
Total 80-03	5,513	222,892	4,156	209,632	1.33	1.06

Table 2: Descriptive statistics and correlation matrices

This table reports correlation matrices and descriptive statistics. Panel A reports it for different measures of performance (Return, IRR and multiple), investment duration in years, and investment size in million of 2006 US dollars. Panel B reports it for Return and the set of explanatory variables: Experience measured by the sequence number the investments for the buyout firm, Equity Under Management in million of 2006 US dollars, busy-ness as measured by the number of investments done over the last 12 months, investment size in million of 2006 US dollars, firm age at the time of the investment, past performance as measured by the time value weighted average return obtained on all previously made investments, supply of buyout capital as measured by the log of number of buyout investments realized during the same year, the average value of the three factors of Fama-French during investment's life, and credit spread (BAA corporate bond yield minus AAA corporate bond yields). Definition details are provided in the text. Descriptive statistics are shown before any log transformation (i.e. for the original variable) and winsorization. Correlations are always shown after log transformation if any and after winsorization (95th percentile). All the variables are log transformed except return, IRR, past performance and risk factors.

Panel A: Performance and Duration

	Working sample					Fully liquidated sample				
	Return	IRR	Multiple	Duration	Size	Return	IRR	Multiple	Duration	Size
Return	1.00					1.00				
IRR	0.95	1.00				0.95	1.00			
Multiple	0.85	0.82	1.00			0.84	0.80	1.00		
Duration	-0.39	-0.39	-0.10	1.00		-0.42	-0.43	-0.07	1.00	
Size	-0.05	-0.07	-0.06	0.08	1.00	-0.04	-0.08	-0.03	0.06	1.00
25 th percentile	-0.03	0.00	0.88	3.00	5	0.02	0.03	1.08	2.67	5
50 th percentile	0.17	0.21	1.90	4.17	14	0.26	0.31	2.38	3.92	13
75 th percentile	0.42	0.52	3.50	5.25	38	0.56	0.68	4.27	4.75	34
95 th percentile	1.37	1.90	11.11	8.67	164	1.37	1.90	11.12	8.56	151

Panel B: Explanatory variables

	Return	Seq.	EUM	Busy	Size	Age	Past perf	Supply BO	Market return	Credit spread	SMB	HML
Return	1.00											
Sequence	-0.16	1.00										
EUM	-0.14	0.73	1.00									
Busy	-0.15	0.67	0.37	1.00								
Size	-0.05	0.15	0.61	-0.16	1.00							
Age	-0.08	0.67	0.58	0.02	0.33	1.00						
Past perf	0.16	-0.36	-0.25	-0.34	0.00	-0.12	1.00					
Supply BO	-0.13	0.35	0.33	0.27	0.16	0.22	-0.30	1.00				
Market return	0.21	-0.16	-0.18	-0.10	-0.13	-0.13	0.17	-0.33	1.00			
Credit spread	0.08	-0.29	-0.26	-0.18	-0.15	-0.20	0.24	-0.80	0.20	1.00		
SMB	-0.15	0.15	0.18	0.09	0.14	0.11	-0.18	0.28	-0.66	-0.21	1.00	
HML	-0.12	0.04	0.10	-0.03	0.11	0.09	-0.08	0.08	-0.65	0.06	0.41	1.00

Mean	0.15	32.58	717.97	8.28	32.64	6.43	0.13	369.56	0.12	0.09	0.01	0.04
25 th percentile	-0.04	8.00	87.35	3.00	5.61	2.00	0.03	214.00	0.06	0.08	-0.03	0.01
50 th percentile	0.16	19.00	249.72	5.00	14.56	5.08	0.11	349.00	0.14	0.08	0.00	0.04
75 th percentile	0.41	46.25	771.02	10.00	38.72	9.42	0.22	535.00	0.19	0.09	0.06	0.07
95 th percentile	1.28	104.00	3246.27	24.00	163.79	17.67	0.48	685.00	0.24	0.11	0.13	0.15

Table 3: Performance of Buyout Investments

This table shows performance of buyout investments in different sub-samples and according to different measures (return, IRR, multiple). The fraction (value weighted) of investments exited by IPO divided by those exited by sale or ipo, and value weighted average duration are also shown. Return and IRR are either value weighted (VW) or time value weighted (TVW). In Panel A, sub-samples are fully liquidated, star firms, investments exited via IPO or sale. In Panel B, sub-samples are countries. In Panel C, sub-samples are industries.

Panel A: By exit status and type

Samples	N inv	Tot. size	Return	IRR	Multiple	Return	IRR	Multiple	% IPO	Duration
			Median	Median	Median	TVW	TVW	VW		VW
All	3,560	150.37	0.17	0.21	1.90	0.07	0.21	2.70	0.50	4.51
Fully liquidated	1,388	57.97	0.26	0.31	2.38	0.14	0.24	3.51	0.46	4.27
Star firms	1,778	115.63	0.15	0.20	1.95	0.05	0.20	2.71	0.57	4.71
Early star firms	881	41.35	0.19	0.25	2.16	0.07	0.19	2.92	0.61	5.00
Late star firms	897	74.28	0.12	0.15	1.70	0.03	0.20	2.56	0.54	4.50
Exited via IPO	499	26.36	0.32	0.41	3.36	0.26	0.57	4.08	1.00	4.82
Exited via Sale	735	25.06	0.29	0.35	2.52	0.29	0.60	3.20	0.00	3.85

Panel B: By country

Samples	N inv	Tot. size	Return Median	IRR Median	Multiple Median	Return TVW	IRR TVW	Multiple VW	% IPO	Duration VW
US	1,978	110.36	0.17	0.22	2.03	0.06	0.20	2.83	0.52	4.66
UK	778	18.07	0.14	0.18	1.67	0.07	0.16	2.07	0.38	4.01
France	181	3.43	0.14	0.17	1.79	0.16	0.23	2.36	0.38	4.35
Sweden	102	2.63	0.25	0.31	2.41	0.31	0.41	3.10	0.25	4.02
Germany	91	3.46	0.17	0.22	1.80	-0.02	0.10	2.20	0.67	4.37
Spain	40	0.45	0.22	0.28	1.96	0.18	0.37	3.05	0.10	5.05
Italy	68	0.86	0.20	0.21	1.81	0.11	0.38	2.85	0.75	3.58
Netherlands	34	0.98	0.12	0.20	1.59	0.21	0.47	5.40	0.62	5.29
Europe	97	3.48	0.17	0.21	2.05	0.09	0.18	2.20	NA	3.95
Developing countries	21	0.87	0.14	0.15	1.28	0.12	0.17	1.89	NA	3.59
Unknown	31	0.94	0.04	0.06	1.07	-0.13	-0.08	1.45	NA	3.78
Other countries	139	4.83	0.22	0.26	2.25	0.14	0.41	2.95	0.62	4.49

Panel C: By industry

Samples	N inv	Tot. size	Return	IRR	Multiple	Return	IRR	Multiple	% IPO	Duration
			Median	Median	Median	TVW	TVW	VW		VW
Services	559	25.83	0.17	0.22	1.90	0.08	0.47	2.63	0.55	4.39
Industrial	482	11.36	0.15	0.19	1.88	0.05	0.28	2.57	0.48	4.63
High-tech	378	13.47	0.23	0.30	2.14	0.14	0.25	2.84	0.37	3.98
Household	248	5.70	0.12	0.15	1.71	0.04	0.08	2.51	0.59	4.77
Wholesale	215	5.88	0.21	0.26	2.27	0.04	0.24	2.70	0.31	4.38
Leisure	185	7.91	0.17	0.22	1.81	0.07	0.13	2.19	0.30	4.22
Transport	169	7.46	0.18	0.22	1.93	0.10	0.15	2.65	0.54	4.42
Health	165	5.27	0.16	0.18	2.00	0.09	0.17	2.53	0.47	4.80
Finance	143	5.83	0.20	0.28	1.95	0.18	0.27	2.81	0.59	4.33
Retail	138	4.15	0.13	0.20	1.88	0.04	0.12	2.63	0.44	4.73
Food	136	3.91	0.20	0.25	2.09	0.05	0.12	3.02	0.45	4.85
Natural resources	105	4.19	0.11	0.15	1.67	0.05	0.15	2.09	0.67	5.26

Table 4: Transition matrix

This table shows the probability of having an investment in a given return quartile conditional on the firm track record being in a given quartile. The inter-quartile thresholds are also displayed. In Panel A the thresholds are computed with equally weighted observations while in Panel B the return threshold is computed with time value weighted observations.

Panel A: Equally weighted – Past performance to current performance

		Return				Inter-quartile thresholds
		Top	Q2	Q3	Bottom	
Past Return	Top	0.32	0.29	0.23	0.15	0.23 0.13 0.05
	Q2	0.25	0.26	0.25	0.24	
	Q3	0.22	0.23	0.26	0.28	
	Bottom	0.21	0.21	0.25	0.33	
Inter-quartile thresholds			0.42	0.17	-0.03	

Panel B: Time-value weighted – Past performance to current performance

		Return				Inter-quartile thresholds
		Top	Q2	Q3	Bottom	
Past Return	Top	0.47	0.22	0.18	0.13	0.23 0.13 0.05
	Q2	0.38	0.20	0.19	0.22	
	Q3	0.33	0.21	0.20	0.26	
	Bottom	0.31	0.18	0.20	0.31	
Inter-quartile thresholds			0.28	0.11	-0.07	

Table 5: Performance Persistence

This table shows results from White's adjusted heteroscedastic consistent least-squares regressions. Dependent variable is investment return. All variables are defined as in Table 3. t-statistics are reported below each coefficient in italics. In Panels B to F, results are shown for sub-samples (of the working sample) according to whether a given characteristic is strictly above the median of that characteristic in the working sample or not. A constant is always included but not reported. Country and industry fixed effects may or may not be included. See text for detailed definitions.

Panel A: Working sample

	Spec 1	Spec 2	Spec 3	Spec 4	Spec 5	Spec 6	Spec 7	Spec 8	Spec 9	Spec 10	Spec 11
Sequence	0.02	0.02	0.01								
	<i>0.62</i>	<i>0.57</i>	<i>0.50</i>								
EUM	-0.02	-0.02	-0.02	-0.02	-0.02	-0.03		-0.03			
	<i>-1.47</i>	<i>-1.47</i>	<i>-1.55</i>	<i>-3.32</i>	<i>-3.21</i>	<i>-4.28</i>		<i>-4.72</i>			
Busy	-0.07	-0.07	-0.07	-0.05	-0.06	-0.06	-0.07				
	<i>-2.63</i>	<i>-2.60</i>	<i>-2.45</i>	<i>-3.89</i>	<i>-4.29</i>	<i>-4.30</i>	<i>-5.52</i>				
Size	0.00	0.00	0.00								
	<i>0.22</i>	<i>0.21</i>	<i>0.04</i>								
Age	-0.02	-0.02	-0.02								
	<i>-0.71</i>	<i>-0.75</i>	<i>-0.68</i>								
Past perf	0.22	0.22	0.24	0.24	0.23	0.28	0.25	0.28	0.33	0.40	
	<i>4.38</i>	<i>4.33</i>	<i>4.95</i>	<i>4.95</i>	<i>4.96</i>	<i>6.03</i>	<i>5.36</i>	<i>6.29</i>	<i>7.47</i>	<i>9.01</i>	
Supply BO	-0.04	-0.04	-0.03	-0.03							
	<i>-2.01</i>	<i>-1.90</i>	<i>-1.66</i>	<i>-1.59</i>							
Market ret.	1.16	1.15	1.18	1.18	1.07		1.11	1.08	1.13		1.30
	<i>6.05</i>	<i>6.02</i>	<i>6.16</i>	<i>6.17</i>	<i>9.35</i>		<i>9.66</i>	<i>9.39</i>	<i>9.89</i>		<i>6.96</i>
Credit spread	-1.84	-1.73	-1.88	-1.80							1.37
	<i>-1.89</i>	<i>-1.80</i>	<i>-1.94</i>	<i>-1.89</i>							<i>2.21</i>
SMB	0.02	0.05	0.07	0.10							-0.03
	<i>0.11</i>	<i>0.22</i>	<i>0.33</i>	<i>0.47</i>							<i>-0.13</i>
HML	0.17	0.15	0.19	0.17							0.18
	<i>0.80</i>	<i>0.71</i>	<i>0.91</i>	<i>0.82</i>							<i>0.84</i>
Country FE	yes	yes	no	no	no	no	no	no	no	no	no
Industry FE	yes	no	yes	no	no	no	no	no	no	no	no
R-bar	0.07	0.07	0.07	0.07	0.07	0.04	0.06	0.06	0.06	0.02	0.04
N-obs	3,445	3,445	3,445	3,445	3,445	3,445	3,445	3,445	3,445	3,445	3,560

Panel B: Sub-samples

	Busy	Not busy	Old	Young	Star	Non-star	Large	Small	Exp	Non-exp	US	Non US
EUM	-0.02	-0.02	-0.02	-0.01	-0.03	0.01	-0.05	-0.02	-0.02	-0.01	-0.02	-0.01
	-2.22	-1.97	-1.73	-1.11	-3.25	0.52	-3.62	-1.35	-1.62	-1.12	-2.41	-1.03
Busy	-0.04	-0.03	-0.04	-0.09	-0.06	-0.07	-0.06	-0.08	-0.06	-0.05	-0.08	-0.06
	-1.34	-0.88	-2.07	-4.64	-2.71	-3.76	-3.34	-3.63	-2.99	-2.00	-3.28	-3.32
Past perf	0.21	0.24	0.12	0.24	0.28	0.21	-0.01	0.28	0.08	0.25	0.21	0.26
	1.86	4.67	1.28	4.47	3.47	3.56	-0.12	5.26	0.64	4.92	3.44	3.49
Market ret.	1.06	1.10	1.41	0.68	1.05	1.09	1.10	1.11	1.23	0.91	1.02	1.13
	6.24	6.91	8.96	4.08	5.66	7.39	7.36	6.11	8.05	5.17	6.27	7.03
Country FE	no	no	no	no	no	no	no	no	no	no	no	no
Industry FE	no	no	no	no	no	no	no	no	no	no	no	no
R-bar	0.05	0.05	0.07	0.07	0.07	0.07	0.06	0.07	0.06	0.04	0.06	0.08
N-obs	1,624	1,821	1,779	1,666	1,756	1,689	1,779	1,666	1,762	1,683	1,913	1,532

Panel C: Experience and persistence

	Exp	Non-exp	Exp	Non-exp	Exp	Non-exp	Exp	Non-exp
EUM	-0.02	-0.01					-0.03	-0.02
	-1.62	-1.12					-2.91	-1.55
Busy	-0.06	-0.05					-0.06	-0.04
	-2.99	-2.00					-3.04	-1.58
Past perf	0.08	0.25	0.45	0.30	0.20	0.28	0.31	0.27
	0.64	4.92	4.29	5.83	1.86	5.43	2.70	5.35
Market ret.	1.23	0.91			1.26	0.90		
	8.05	5.17			8.37	5.12		
Country FE	no	no	no	no	no	no	no	no
Industry FE	no	no	no	no	no	no	no	no
R-bar	0.06	0.04	0.01	0.02	0.05	0.04	0.02	0.02
N-obs	1,762	1,683	1,762	1,683	1,762	1,683	1,762	1,683

Panel D: EUM and persistence

	Large	Small	Large	Small	Large	Small	Large	Small
EUM	-0.05	-0.02					-0.06	-0.03
	-3.62	-1.35					-4.70	-2.12
Busy	-0.06	-0.08					-0.06	-0.07
	-3.34	-3.63					-3.41	-3.15
Past perf	-0.01	0.28	0.40	0.36	0.14	0.34	0.21	0.29
	-0.12	5.26	4.40	7.06	1.53	6.72	2.14	5.59
Market ret.	1.10	1.11			1.17	1.12		
	7.36	6.11			7.87	6.15		
Country FE	no	no	no	no	no	no	no	no
Industry FE	no	no	no	no	no	no	no	no
R-bar	0.06	0.07	0.01	0.03	0.05	0.06	0.02	0.04
N-obs	1,779	1,666	1,779	1,666	1,779	1,666	1,779	1,666

Panel E: Time effects

	73-95	96+	73-95	96+	73-95	73-95	96+	96+	73-95	73-95	96+	96+
					old	young	old	young	old	young	old	young
EUM	-0.02	-0.02			-0.03	-0.01	-0.01	-0.01				
	-2.29	-1.95			-1.80	-0.93	-0.73	-0.37				
Busy	-0.06	-0.06			-0.03	-0.08	-0.06	-0.08				
	-2.60	-3.48			-0.77	-3.01	-2.37	-3.18				
Past perf	0.29	0.10	0.35	0.38	0.30	0.26	-0.03	0.15	0.40	0.33	0.34	0.40
	4.75	1.44	6.10	5.39	1.96	3.98	-0.26	1.64	2.76	5.22	2.97	4.61
Market ret.	0.35	1.47			1.04	0.04	1.75	1.11				
	0.20	9.58			2.40	0.10	8.52	4.87				
Country FE	no	no	no	no	no	no	no	no	no	no	no	no
Industry FE	no	no	no	no	no	no	no	no	no	no	no	no
R-bar	0.03	0.10	0.02	0.01	0.02	0.04	0.09	0.10	0.01	0.03	0.00	0.03
N-obs	1,714	1,731	1,714	1731.00	693	1,021	1,086	645	693	1,021	1,086	645

Panel F: Star firms

	Star old	Star young	Non-star old	Non-star young	Star old	Star young	Non-star old	Non-star young
EUM	-0.02	-0.05	0.01	0.01				
	<i>-1.30</i>	<i>-2.68</i>	<i>0.29</i>	<i>0.83</i>				
Busy	-0.06	-0.04	0.03	-0.10				
	<i>-2.66</i>	<i>-0.75</i>	<i>0.66</i>	<i>-5.02</i>				
Past perf	0.25	0.29	-0.01	0.22	0.68	0.36	0.09	0.37
	<i>1.76</i>	<i>2.76</i>	<i>-0.04</i>	<i>3.45</i>	<i>5.16</i>	<i>3.76</i>	<i>0.68</i>	<i>6.17</i>
Market ret.	1.22	0.43	1.70	0.76				
	<i>6.08</i>	<i>0.75</i>	<i>6.34</i>	<i>4.37</i>				
Country FE	no	no	no	no	no	no	no	no
Industry FE	no	no	no	no	no	no	no	no
R-bar	0.06	0.04	0.09	0.08	0.02	0.03	-0.00	0.04
N-obs	1,273	483	506	1,183	1,273	483	506	1,183

Panel G: Track record window

	All	All, except last year	Last 5 years, except last	Only fully liq at inv time	All	All, except last year	Last 5 years, except last	Only fully liq at inv time
EUM	-0.02	-0.03	-0.03	-0.04				
	<i>-3.21</i>	<i>-3.60</i>	<i>-3.43</i>	<i>-4.42</i>				
Busy	-0.06	-0.06	-0.06	-0.06				
	<i>-4.29</i>	<i>-3.96</i>	<i>-4.24</i>	<i>-3.76</i>				
Past perf	0.23	0.15	0.12	0.03	0.40	0.28	0.26	0.05
	<i>4.96</i>	<i>3.09</i>	<i>2.63</i>	<i>0.84</i>	<i>9.01</i>	<i>6.16</i>	<i>6.06</i>	<i>1.66</i>
Market ret.	1.07	1.05	1.04	1.15				
	<i>9.35</i>	<i>8.65</i>	<i>8.51</i>	<i>8.85</i>				
Country FE	no	no	no	no	no	no	no	no
Industry FE	no	no	no	no	no	no	no	no
R-bar	0.07	0.06	0.06	0.06	0.02	0.01	0.01	0.00
N-obs	3,445	2,972	2,954	2,490	3,445	2,972	2,954	2,490

Panel H: Other performance measures

	IRR	Multiple	IRR	Multiple
EUM	-0.02	-0.03		
	-3.21	-3.43		
Busy	-0.06	-0.12		
	-4.29	-7.31		
Past perf	0.23	0.38	0.40	0.60
	4.96	5.97	9.01	9.90
Market ret.	1.07	0.05		
	9.35	3.19		
Country FE	no	no	no	no
Industry FE	no	no	no	no
R-bar	0.07	0.06	0.02	0.03
N-obs	3,445	3,445	3,445	3,445

Table 6: Within Quartile Analysis

This table shows the results from the same regression as in Table 5 when done separately for each past performance quartile. At the bottom of the table, we report the standard deviation of the returns, the fraction of investments with negative returns, the fraction of investments that are bankrupt, and the median and mean performance within each quartile.

	Loser	Q2	Q3	Winner
EUM	-0.02	-0.01	-0.02	-0.02
	<i>-1.14</i>	<i>-0.58</i>	<i>-1.18</i>	<i>-1.83</i>
Busy	-0.07	-0.04	-0.09	0.00
	<i>-3.26</i>	<i>-1.15</i>	<i>-3.23</i>	<i>0.05</i>
Past perf	0.15	0.32	0.21	0.38
	<i>0.98</i>	<i>0.37</i>	<i>0.38</i>	<i>4.19</i>
Market ret.	1.06	1.46	0.93	0.94
	<i>4.34</i>	<i>6.35</i>	<i>3.70</i>	<i>3.88</i>
Country FE	no	no	no	no
Industry FE	no	no	no	no
R-bar	0.06	0.06	0.03	0.04
N-obs	775	890	890	890
Volatility	0.55	0.56	0.51	0.52
% losses	0.44	0.40	0.33	0.25
% Bankrupt	0.15	0.16	0.11	0.07
Median perf	0.06	0.08	0.12	0.18
Mean perf	0.02	0.04	0.12	0.23

Table A.1. Buyout firms with more than \$10 billion under management according to TVE

Firm Name	Firm Type	City	Size (\$ Mil)
TA Associates, Inc.	PE Firm Investing Own Capital	Boston	10000
Advent International	PE Firm Investing Own Capital	Boston	10000
HM Capital Partners LLC	PE Firm Investing Own Capital	Dallas	11000
EQT Partners AB	PE Firm Investing Own Capital	Stockholm	11000
Charterhouse Capital Partners LLP	PE Firm Investing Own Capital	London	11378
Welsh, Carson, Anderson & Stowe	PE Firm Investing Own Capital	New York	12000
Permira Advisers Limited	PE Firm Investing Own Capital	London	12000
AIG Global Investment Group	Insurance Firm	New York	12700
Madison Dearborn Partners LLC	PE Firm Investing Own Capital	Chicago	14000
3i Group PLC	PE Firm Investing Own Capital	London	14311
Terra Firma Capital Partners, Ltd.	PE Firm Investing Own Capital	London	14357
BC Partners	PE Firm Investing Own Capital	London	14952
Apollo Management	Investment/Merchant Bank	New York	18500
Thomas H. Lee Partners	PE Firm Investing Own Capital	Boston	20000
Providence Equity Partners, Inc.	PE Firm Investing Own Capital	Providence	21000
American Securities Capital Partners, LLC	Investment/Merchant Bank	New York	21000
Goldman, Sachs & Co.	Investment/Merchant Bank	New York	23621
J.P. Morgan Partners	Commercial Bank	New York	25000
CVC Capital Partners	PE Firm Investing Own Capital	London	25058
Bain Capital	PE Firm Investing Own Capital	Boston	27000
Kohlberg, Kravis, Roberts & Co.	PE Firm Investing Own Capital	New York	27000
Credit Suisse Private Equity	Investment/Merchant Bank	New York	28000
Texas Pacific Group	PE Firm Investing Own Capital	Fort Worth	30000
Blackstone Group, L.P.	Investment/Merchant Bank	New York	45192
Carlyle Group, The	PE Firm Investing Own Capital	Washington	56000

Table A.2. Statistics on Missing Information

This table shows descriptive statistics about missing information in PPMs about either duration or IRR. Total size is in billion of deflated size in US dollar. Average IRR and duration and shown after extrapolation.

		N obs.	Total Size	Multiple VW	IRR TVW	Duration VW
	Working sample	3,560	150.37	2.56	0.21	4.53
Duration	Available (fully)	2,271	78.56	2.49	0.23	4.56
	Missing month only	215	5.78	1.84	0.13	4.75
	IRR available	679	39.40	4.04	0.49	4.40
	No IRR – set to average	395	26.63	0.77	0.00	4.56
IRR	Available	2,882	118.95	3.00	0.28	4.47
	Multiple and duration available	461	12.76	0.82	-0.09	5.17
	Only Multiple available	217	18.66	0.97	-0.07	4.57

Table A.3. Industry classification

Industries	Nb inv.	Fama-French industry classification
Wholesale	215	Wholesale
Retail	138	Retail
Household	248	Consumer Goods, Apparel
Services	559	Personal Services, Business Services
Food	136	Food Products, Candy & Soda
High-tech	378	Communication, Computers, Electronic Equipment
Health	165	Healthcare, Medical Equipment, Pharmaceutical Products
Finance	143	Banking, Insurance, Real Estate, Trading
Leisure	185	Recreation, Entertainment, Printing and Publishing, Restaurants, Hotels, Motels
Transport	169	Automobiles and Trucks, Aircraft, Transportation
Natural resources	105	Agriculture, Mining, Coal, Petroleum and Natural Gas, Utilities, Business Supplies
Industrial	482	Chemicals, Textiles, Construction, Steel, Machinery, Equipment (Electrical, Lab), Products (Rubber, Plastic, Fabricated)
Other	20	Beer & Liquor, Defense, Shipping Containers, Other