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Analyzing the impact of subscription lines on private equity fund characteristics[1]

August 2019

1 This work has been written as part of a research project of BlackRock and Technical University of Munich (TUM). Its intention is to inform selected financial market participants about the impact of subscription lines used by private equity funds. For further analyses and details, please compare the related academic paper, available upon request.

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Summary

- A subscription line is a loan taken out by private market funds that enables the fund manager to make investments quickly without the need for irregular capital calls from the investors.
- The loan is eventually repaid by capital calls from the investors. As a result, a subscription line effectively delays capital calls, thereby shortening the investor's holding period and increasing internal rate of return (IRR), assuming performance is sufficiently positive.
- This work studies how subscription lines impact private equity fund performance in great detail and analyzes the effect of different borrowing conditions on IRR and multiple under different performance scenarios and across a broad range of vintage years. Going one step further, we also study how these facilities ultimately influence crucial elements such as quartile ranking and profit sharing between the manager of the fund and its investors.
- We have found that, at the end of the fund lifetime, the difference in IRR and money multiple with and without the use of a subscription line is relatively modest under average conditions, about +0.5 percentage points and -0.02x, respectively. Yet the terms of the loan, the prevailing interest rates and the gross performance influence this difference which can range from negative values to up to +2 percentage points.
- On average, quartile rankings are positively impacted for just 2.4% of all simulated funds, however participation of the fund's manager in the absolute total amount of profit is lower.
- We suggest that subscription lines are more useful as a portfolio management tool that simplifies the operations for both the fund manager and its investors rather than as an instrument to boost performance and obscure performance evaluation. Yet extensive experience in best practices in using subscription lines is crucial which underlines the importance of thorough due diligence of private market funds.

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1. Introduction

A subscription line, also called a credit facility, is a loan taken out mostly by closed-end private market funds, in particular by private equity funds. The loan is secured against a fund's investor commitments, generally without recourse to the actual underlying investments in the fund. The main purpose of the subscription line is to enable the fund manager to make investments quickly without the need for irregular capital calls on short notice from the investors. Instead, the outstanding loan amount is repaid regularly by capital calls from the investors in the fund. Consequently, a subscription line on the one hand alleviates the fund from holding large amounts of cash that would ultimately dilute performance and on the other hand gives the investors the opportunity to earn a return in other asset classes with the unfunded portion of their commitment. It should be emphasized that subscription lines should neither be confused with permanent leverage at the fund level nor can they be used to allow the fund to invest more than 100% of investors' commitments (other than by recycling proceeds from early realized investments).

A subscription line is a distinct portfolio management tool and the advantages for the fund manager and fund investors are clear: the manager can quickly draw on the facility whenever needed to fund investments and periodically pay down the facility with regular capital calls from investors. This reduces the administrative burden on managers and investors alike. In effect, a subscription line delays capital calls, thereby shortening the investor's holding period and, assuming a sufficiently positive performance, increases the IRR. This effect is generally larger during the initial years of the fund and diminishes over time to a stable value.

Lenders like these loans from a risk-reward perspective because 1) the creditworthiness of the investors is high (mostly high-quality institutional investors), 2) the actual size of the loans is typically capped at 30% of the investor's commitment and 3) the maturities are relatively short (three, six or 12 months).

Initially, these subscription lines were pure short-term bridge financing, which was repaid in 30 to 90 days. In the last few years, borrowing provisions have become less restrictive: for instance, maturities are being stretched to a full year and permitted purposes now often include paying fees and expenses as well as liabilities. While uncommon, some managers keep the loans outstanding until divestment and might distribute back capital to investors that was never called. Even more liberal provisions allow financing distributions to investors if exit proceeds are temporarily blocked or held back for other reasons. It should be no surprise that, in part due to low interest rates, the use of subscription lines has increased dramatically, and overall outstanding volume might be as high as USD$400 billion today.[2]

The use of subscription lines has recently been debated and somewhat criticized as the lines also come with distinct disadvantages. As said, a subscription line might boost the IRR when performance is sufficiently positive but when a fund's performance is negative, the IRR will actually be lower than without a subscription line. In other words, subscription lines effectively amplify the dispersion of a fund's performance in terms of IRR. The latter statement should be no surprise given subscription lines are conceptually a form of short-term leverage.

2 Lenders and lines: a guide to fund finance. Private Equity International – 8 February 2018.

Irrespective of performance, the costs of servicing the loan (interest costs and loan-related expenses) are typically expensed to the fund and hence borne by its investors, thus lowering the money multiple measured as cumulative distributions to paid-in capital (DPI). While shortening the investor's holding period might boost the IRR, it may also lower the absolute amount of the hurdle or preferred return on which the performance-related compensation depends. Hence, subscription lines can in some cases result in a scenario that a manager will earn more performance fees even though the money multiple will end up lower. Other disadvantages could include reducing the likelihood of potential secondary sales as the loan is tied to the creditworthiness of the initial investor which might be much higher than that of a potential secondary buyer down the road. Finally, conceptual difficulties arise when benchmarking private equity funds that use subscription lines against funds that do not or when benchmarking against public equity indices.

To unite investors and to increase transparency, the Institutional Limited Partners Association (ILPA) recently published a paper that proposes best practices in using subscription lines, and addresses these and other common concerns of private equity investors about subscription lines. Interestingly, there have been numerous articles discussing subscription lines, but surprisingly little quantitative studies are devoted to this topic. In this paper, we try to provide a more complete picture of the effect of subscription lines on the performance of private equity funds. We analyze the effect of different borrowing conditions on IRR and multiple under different performance scenarios and across a broad range of vintage years. Going one step further, we also try to study the implications of these modified performance metrics on peer benchmarking and profit sharing.

2. Simulating private equity fund performance

A simplistic way of studying the effect of subscription lines would be to use cash flow patterns of a typical or average buyout fund and vary the terms of a hypothetical loan across multiple scenarios to study their impact on performance. However, such a deterministic approach would not capture the full variability of outcomes as these cash flow patterns can be widely different depending on the prevailing market conditions, geography, segment of the market and ultimately on the manager itself. In this work, a stochastic model was built for the purpose of analyzing the full breadth of effects of the subscription lines on fund performance. This chapter explains how the stochastic model utilizes gross private equity deal level information to simulate the cash flows and ultimately the performance experience of an investor in representative private equity funds of a given vintage year.

This study uses a large proprietary dataset of buyout deals. In addition to general fund-related information, a key feature of this dataset is the availability of monthly gross cash flows between each portfolio company and the respective private equity fund. This more granular data enables more relevant return measures, such as those discussed in this paper, to be calculated. Over 6,000 buyout deals with initial investment dates ranging from 1994 to 2013 were included in the simulation. More than 95% of the deals are fully realized and each deal has a capital investment of at least 5 million, denominated in either USD (55%), EUR (39%) or GBP (6%). All included deals were held for at least nine months and the most recent cash flow was registered at July 31, 2017.

The sequence and methodology of the stochastic model is as follows:

1. Sample a vintage year, i.e. the calendar year in which the first investment is made, and the first capital call takes place. The probability of drawing the vintage year is derived from historical fund-raising figures which ensures that simulated results are virtually capital weighted across the analyzed span of vintage years.[3]

2. Draw randomly 15 buyout deals with their monthly gross cash flows from the set of transactions that were conducted within five years after the start date. For instance, if vintage 2003 is drawn, all deals are made during the period 2003-2007. All deals are then evenly distributed over a five-year investment period, implying one deal every four months. It is important to note that the simulation is not weight-neutralized, meaning that the actual sizes of the sampled deals are maintained, and the fund size depends on the sum of capital invested in these 15 deals.

3. Ensure all resulting cash flows are in USD and convert cash flows denominated in other currencies using appropriate rates. The maximum fund life is assumed to be 15 years. Remaining minimal distributions after the 15th anniversary of the fund, if any, are net-present-valued to that date with an additional discount.

4. Incorporate management fees and carried interest. Standard market terms were used: 2% annual management fee on commitment during the investment period and on invested capital thereafter, and a 20% carried interest rate over an 8% hurdle with 100% catch-up with a European waterfall.

5. Account for fund establishment costs (1% of fund size) and a cash buffer (0.5% at inception and during the investment period and reducing to 0% at the end of the fund).

6. Consolidate into net fund-level cash flows in USD at a monthly frequency and calculate relevant performance metrics at the end of the fund lifetime.

Repeating this simulation 15,000 times results not only in probability distributions of valid net IRR and net multiple at the end of the fund, but also in monthly cash flows across the life of the fund.

Figure 1 shows the simulated cash flow experience of the investors by quartile, compared to the median for actual industry data. As it can be seen, the median of the simulation is relatively close to the median of the industry data[3], underscoring the validity of the applied simulation methodology. The 25th and 75th percentiles indicate the bandwidth of outcomes and are also in accordance with industry data.

3 Burgiss Private iQ. Globally diversified buyouts, vintages 1994-2009 per September 30, 2017.

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Figure 1: Cumulative net cash flows curve of the simulation compared to industry data

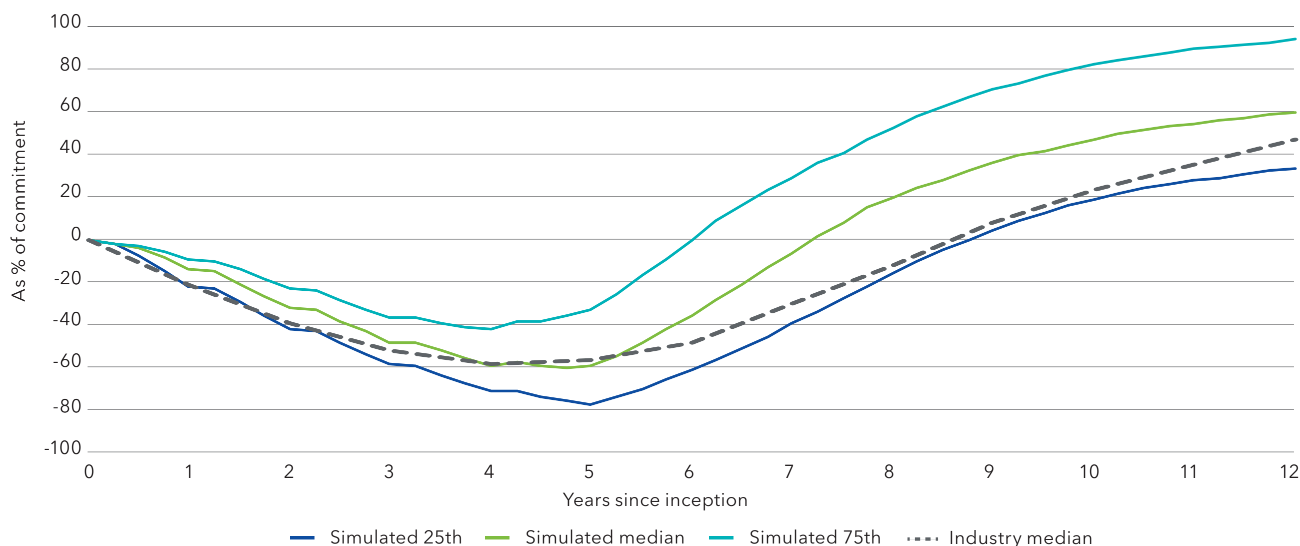


Table 1 shows detailed results of the simulation and compares final net IRR and net DPI to industry data during the same time period.[4] All values are reasonably similar although the simulated values are mostly slightly higher than the industry data. Minor differences are uncritical and to be expected, and can be caused by a number of reasons. First, the scope of the deal database is different and smaller than the scope of the industry data provider. In addition, survivorship biases may exist in the deal database. Second, the deal database only contains almost fully realized deals and hence the simulations represent, especially for the younger vintages, a subset of the industry data which includes both realized and unrealized deals. Third, reoccurring fund expenses such as fund-level administration costs and audit costs are not included in the simulations and might overstate the simulated net returns. Lastly, classification across investment stages such as venture, growth and buyout might not be fully aligned between the employed data set and the industry data.

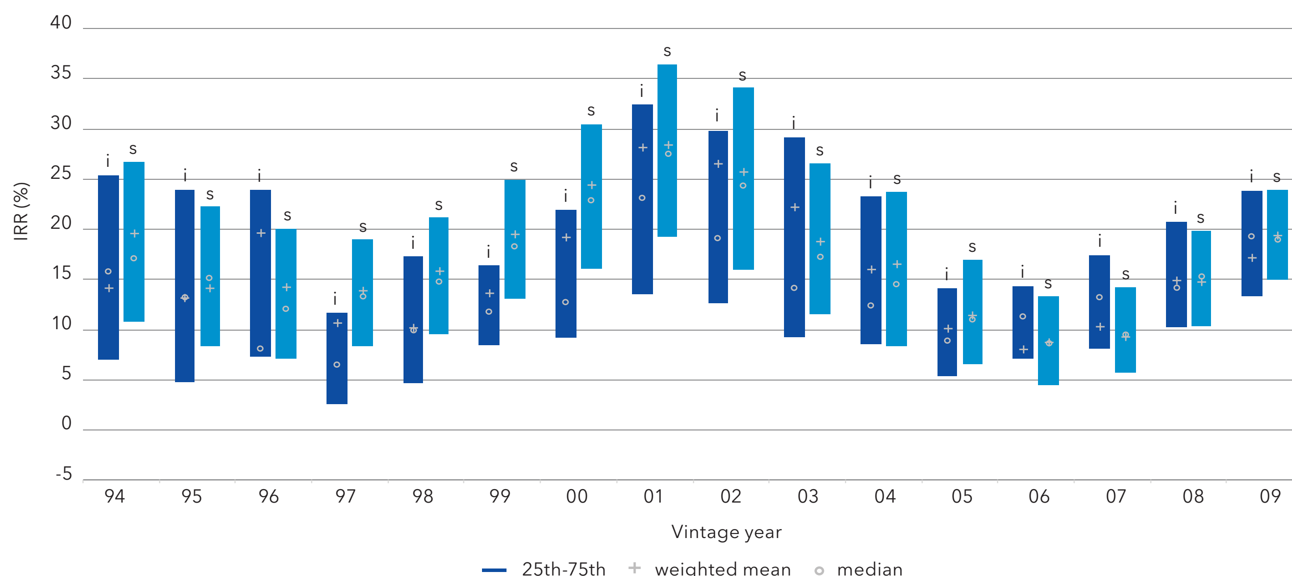
Table 1: Descriptive statistics of the simulations compared to representative industry data[4]

Descriptive statistics	Simulated IRR	Industry IRR[4]	Simulated DPI	Industry DPI[4]
5th percentile	-0.4%	0.4%	0.99x	1.00x
25th percentile	8.3%	8.0%	1.39x	1.29x
Median (50th percentile)	14.3%	12.9%	1.67x	1.60x
75th percentile	21.6%	20.6%	2.03x	2.04x
95th percentile	36.9%	35.4%	2.76x	2.84x
Mean	15.9%	15.3%	1.74x	1.73x
Standard deviation	11.9%	11.7%	0.57x	0.65x
Skewness	1.35	1.63	1.87	1.61
Kurtosis	5.25	5.22	7.83	4.54

4 Burgiss Private iQ. Globally diversified buyouts, vintages 1994-2009 per September 30, 2017, only funds with DPI exceeding 0.75x were considered to account for difference in realization status on a fund level. The industry sample was winsorized at 1st and 99th percentiles.

Table 1 describes the results of the simulation aggregated across all the vintage years. However, as each vintage year shows its own characteristics depending on the prevailing market environment, Figure 2 compares simulated (s) and industry (i) results per vintage year and depicts the interquartile range in the blue bars as well as the weighted mean and the median IRR as crosses and circles, respectively. As can be seen, the trend in performance across vintages is very similar with very strong performance in '01-'02 and challenged performance in '05-'07. In most vintage years, dispersion and average values of both simulated and industry IRR are comparable.

Figure 2: Dispersion of returns per vintage year. i: industry data; s: simulated results[4]



To summarize, Figures 1 and 2, as well as Table 1 demonstrate that the developed stochastic simulation model describes the dynamic of a buyout fund well and its resulting returns match with industry or market data.

3. The impact of subscription lines on fund performance

Having developed a stochastic and realistic model to describe a private equity fund's cash flow experience and hence performance expectations, subscription lines can now be incorporated and analyzed more thoroughly. The standard assumptions used here are based on quotes from seven relevant lenders at the end of 2017. All quotes were largely in line with the following parameters which we believe reflect the current market:

1. The subscription line's main interest rate results from a spread of 2.0% over the 12-month LIBOR in USD and was applied to the drawn part of the loan.

2. Upfront fee and fee on the unused part of the loan were both 0.30%.

4 Burgiss Private iQ. Globally diversified buyouts, vintages 1994-2009 per September 30, 2017, only funds with DPI exceeding 0.75x were considered to account for difference in realization status on a fund level. The industry sample was winsorized at 1st and 99th percentiles.

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3. Maturity of the subscription line was assumed to be three, six or 12 months and the maximum length of the subscription line was four years, meaning the fund can borrow multiple times from the subscription line.

4. Size of the subscription line was assumed to be 20%, 25% or 30% of the unfunded commitment, meaning at most 30% of the fund size at inception and decreasing thereafter.

To visualize the impact, Figure 3 contrasts the cumulative net Limited Partner (LP) cash flows for a simulated fund with (green) and without (blue) the use of a subscription line during the investment period of five years. Whereas capital calls without a subscription line are irregular and frequent, the subscription line ensures regular capital calls that are roughly of the same magnitude. Intuitively, delaying the capital calls shortens the investor's holding period and increases the IRR. On the flip side, the costs of the subscription line likely cause the final multiple to be slightly lower.

Figure 3: Cumulative net cash flows of an example simulated fund with and without the use of a subscription line. Maturity and size of the loan were six months and 25%, respectively

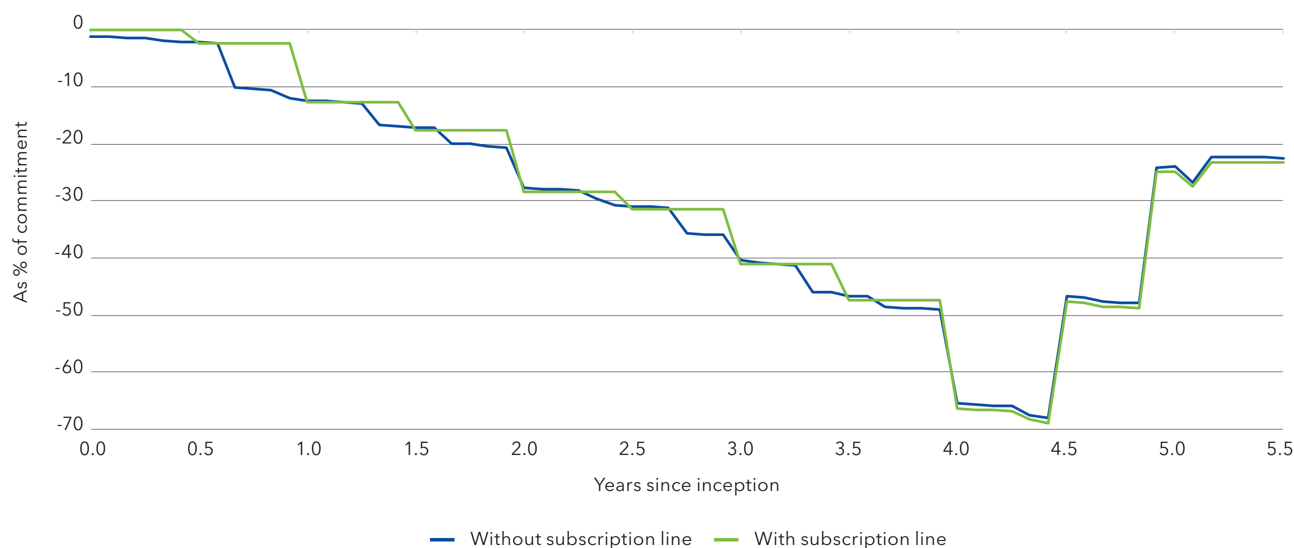

Table 2 summarizes, for three performance metrics at the end of the fund, the differences between simulations with and without subscription lines. It can be seen that the median and mean impact on IRR is +0.2% and +0.5%, respectively.[5] This is certainly lower than the numbers that make the headlines in the press which often focus on short-term effects that diminish in the long term, but the simulation results below are in line with other more refined and data-driven studies.[6,7] The 5th percentile shows a negative IRR impact of -0.3% which clearly demonstrates how subscription lines increase the uncertainty of outcomes. On the other end of the performance spectrum, a top-performing fund's IRR is improved by around 2 percentage points. The impact on multiples ranges from -0.03x to -0.01x and is relatively modest. Average effective duration of the fund is shortened by 0.12 years or roughly six weeks.

5 When discussing such differences, % represents the absolute difference in percentage points unless stated otherwise.
6 *Lines of Credit and their Impact on Performance Evaluation* – Cobalt 2017.
7 It should be emphasized that the results discussed here are at the end of the fund and that the impact on performance during the life of the fund, especially during the investment period and while raising the next fund, might be substantially higher.

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Table 2: Change in performance resulting from the use of a subscription line. As an example, the mean change in IRR is +0.5% which means the mean performance with and without subscription lines are 16.4% and 15.9%, respectively. Please note this does not mean that a fund with an IRR of 15.9% gets an increase in IRR of +0.5% by using a subscription line as the relation between IRR and delta IRR is not linear but convex as shown later. Maturity and size of the loan were six months and 25%, respectively. Duration represents Macaulay duration

Descriptive statistics	Delta IRR	Delta DPI	Delta duration
5th percentile	-0.3%	-0.03x	-0.22y
25th percentile	0.0%	-0.02x	-0.15y
median (50th percentile)	0.2%	-0.02x	-0.12y
75th percentile	0.6%	-0.01x	-0.09y
95th percentile	2.0%	-0.01x	0.01y
Mean	0.5%	-0.02x	-0.12y

The results above summarize the change in performance for all simulations with and without a subscription line at standard maturity (six months) and standard size (25%), yet these conditions might vary and will ultimately influence the impact that a subscription line might have. The sensitivity tables below in Figure 4 show the mean difference in IRR (left) and DPI (right) resulting from the use of a subscription line varying the underlying size and loan maturity assumptions.

Starting on the right-hand side, the delta in DPI increases with size and maturity, with size having a smaller impact on the delta than maturity. Both observations are expected because the servicing costs increase with size and maturity. On the left-hand side, it can be seen that maturity improves the delta in IRR for all loan sizes. This is due to the timing effect of delaying the investor's capital calls. However, for three-month and six-month maturities, the delta IRR declines when increasing the loan size from 20% to 30%. This can be understood because within three or six months, capital calls typically do not exceed 20% or 25% and hence the additional capacity of the loan is unused and simply adds to the servicing costs. For a 12-month maturity, capital calls might exceed 20% or 25% and delaying additional investor capital calls outweigh the costs and thus the overall delta in IRR increases with the loan size.

Figure 4: Sensitivity of delta IRR (in percentage points) and delta DPI on size and maturity of the loan

Mean delta IRR		Size		
		20%	25%	30%
Maturity	3 months	0.16%	0.14%	0.11%
	6 months	0.48%	0.48%	0.47%
	12 months	1.15%	1.19%	1.21%

Mean delta DPI		Size		
		20%	25%	30%
Maturity	3 months	-0.010x	-0.011x	-0.013x
	6 months	-0.015x	-0.017x	-0.019x
	12 months	-0.025x	-0.027x	-0.030x

Both Table 2 and Figure 4 are derived from all simulations across all vintage years and show the average difference in both IRR and multiple. Yet, as discussed above, the impact of a subscription line is expected to be very different for strongly and poorly performing funds and under different interest rate regimes. Thus, Figure 5 depicts the delta in IRR (in percentage points) per vintage year to show how gross performance as well as interest rate influences the impact of using a subscription line. For strong-performing vintages, e.g. '01 as seen in Figure 2, the median and mean delta in IRR reach 1.0% and 1.5%, respectively. In challenged vintages, e.g. '05-'07, the impact of a subscription line is negligible in aggregate. This trend across vintage years is influenced by both gross performance and fluctuating interest rates.

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Figure 5: Difference in IRR with and without subscription line by vintage year. Maturity and size of the loan were six months and 25%, respectively

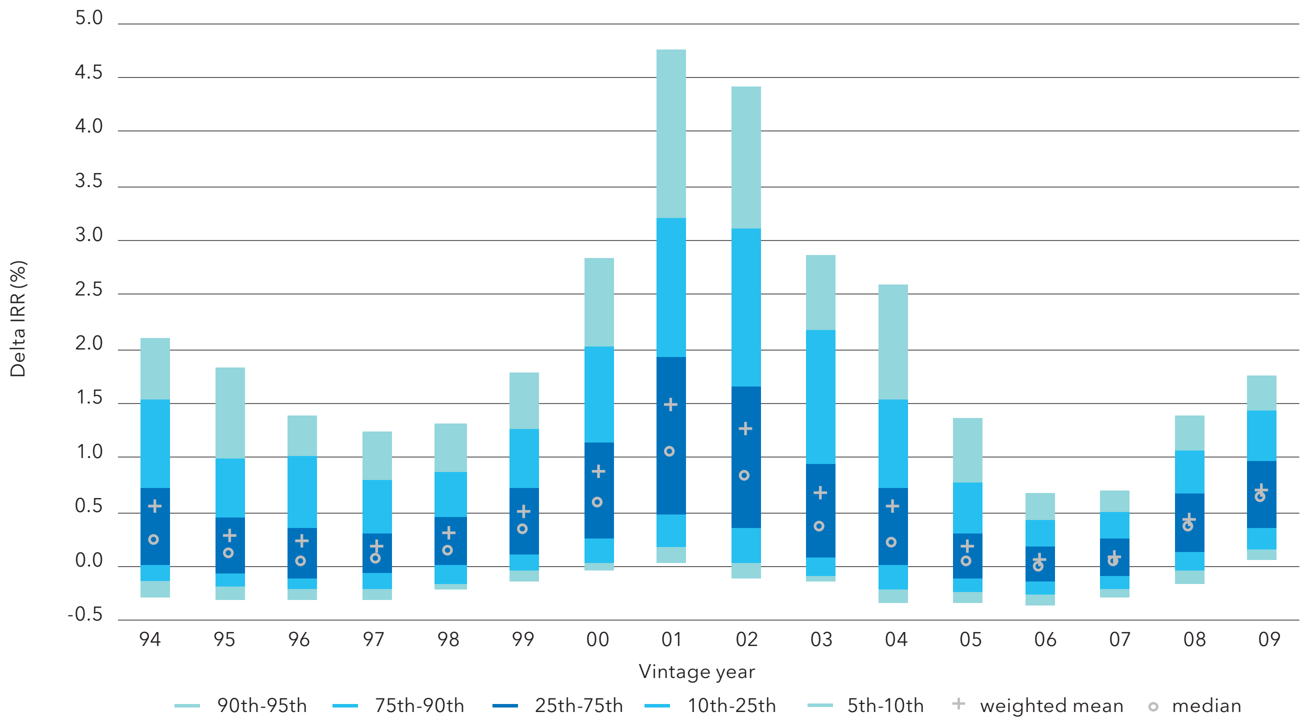

Figure 6 shows the most granular level of the simulation results and shows the relative delta in performance for 250 randomly selected simulated funds. The top chart shows that the boost in IRR increases with performance and is positive for the bulk of the simulated funds. For challenged funds, the impact is negative and transitions to a positive impact at around 8.0% net IRR. Below this performance, the cost of the subscription line outweighs its benefit. The bottom chart shows, for the same 250 funds, the relative delta in DPI which is always negative and diminishes for strongly performing funds.

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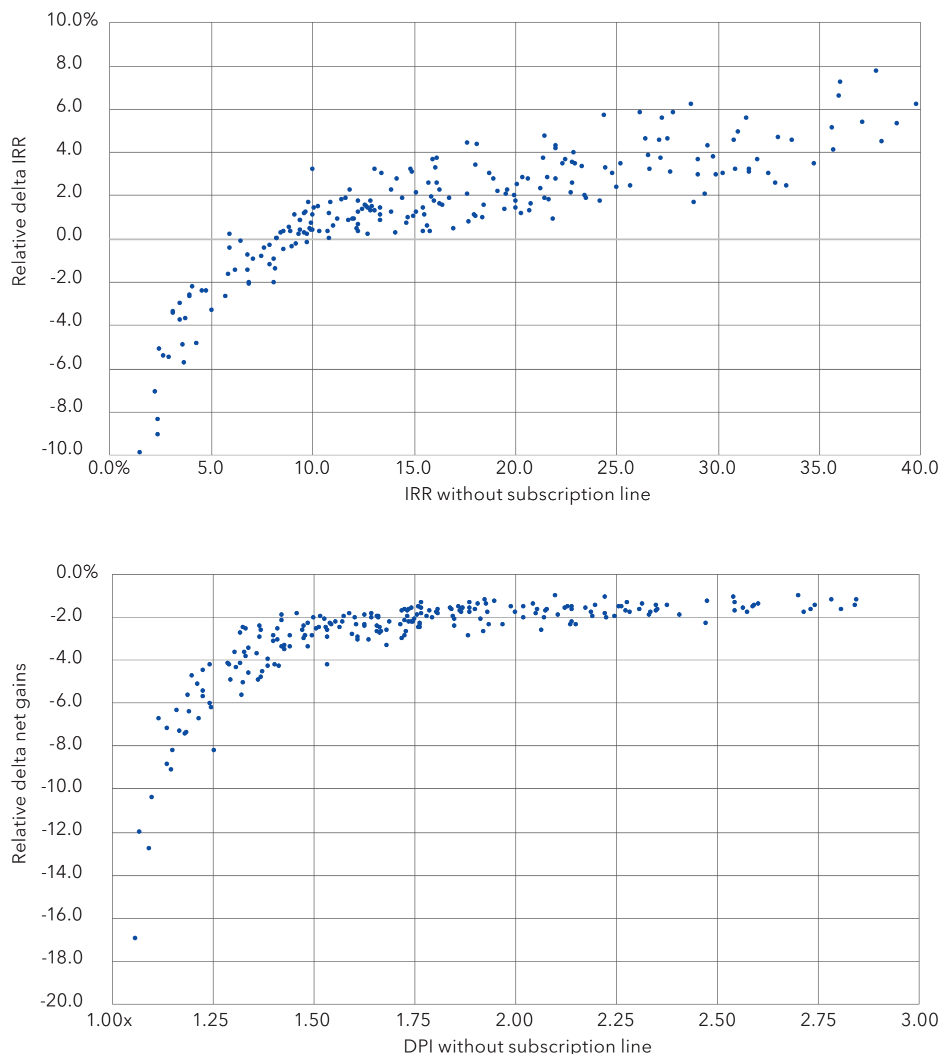
Figure 6: Relative delta for IRR (top, delta in IRR divided by original IRR) and for net gains (bottom, delta in net gains divided by original net gains with net gains representing DPI–1). Note the results are truncated at IRR and DPI of 0.0% and 1.00x, respectively. Maturity and size of the loan were six months and 25%, respectively



So far, the presented results discuss in detail how subscription lines used by private equity managers impact the final net IRR and final net multiple which, in turn, ultimately influence the quartile ranking and profit sharing between LP and General Partner (GP).

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The table below is a transition matrix and shows the percentage of the simulated funds that remain or change their quartile because of the subscription line. The quartile breakpoints are estimated without subscription lines. The rows represent the quartile ranking with a subscription line and the columns represent the quartile ranking without a subscription line. For example, 1.8% of the simulated funds were 2nd quartile without a subscription line and would have been 1st quartile if a subscription line had been used, assuming all other funds did not. In total, quartile ranks improved for 2.6% of the simulated funds and declined for 0.2% of the simulated funds. As discussed, a subscription line lowers money multiple and hence any effect on quartile rankings by multiple would only be negative.

Figure 7: Transition matrix quantifying the percentage of funds that change their quartile when using subscription lines. Maturity and size of the loan were six months and 25%, respectively

Quartiles ranked by IRR		Without subscription line			
		1	2	3	4
With subscription line	1	25.0%	1.8%		
	2		23.2%	0.7%	
	3			24.2%	0.1%
	4			0.2%	24.9%

The effect a subscription line has on a fund's net performance will also affect whether the fund meets the hurdle and hence will impact profit sharing or carried interest. As discussed before, a subscription line effectively shortens the holding period, thereby increasing IRR and increasing the probability of reaching the hurdle and hence payout of carried interest. Yet, final multiples are expected to be lower and it is likely that the absolute amount of carried interest will be lower as well.

Figure 6 showed that it is unlikely that performance of approximately 8% (the typical hurdle rate) without a subscription line, would be improved by using a subscription line. Analyzing the results in more detail, reveals that the carried interest entitlement is lower in 77.3% and higher in 1.1% of simulated funds when a subscription line was used. Yet in those rare cases of a higher carry, the fund's performance is only slightly higher than the hurdle and the fund is just entering the catch-up zone and hence the amount of carried interest is relatively small. In aggregate, absolute amount of carried interest decreases by 1.0% when using a subscription line.

As discussed, the costs of a subscription line are expensed to the fund and these costs typically run through the carried interest waterfall and are returned to the LP before potentially entering the catch-up zone. Since the drawn deals and gross proceeds are identical in both scenarios (with and without subscription line), it is expected and shown above that the overall amount of carried interest will be slightly lower when using a subscription line and the simulations show that the relative share of the profit for the manager (carried interest) increases in 2.4% and decreases in 3.1% of the simulated funds and consequently for 94.5% of the simulated funds it remains unchanged.

All previous analyses focused on returns (IRR and multiple) and how subscription lines influence final performance and ultimately quartile ranking and profit sharing. Yet, Table 2 also shows that the tails of the probability distribution of returns are impacted by subscription lines. For future work, it would be interesting to explore whether subscription lines positively impact return on a risk-adjusted basis, in other words whether the numerator changes more than the denominator when thinking about common metrics such as Sharpe and Sortino ratios.

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4. Conclusions

This work discussed the rise of subscription lines, in particular how and why these loans are used by private equity funds today. This work quantifies the impact of subscription lines on final net performance and concludes that this impact is relatively moderate on average, with the median and mean IRR changing by +0.2 percentage points and +0.5 percentage points, respectively. This impact is influenced by the terms of the loan and gross performance and differs through the analyzed vintage years. Quartile ranking by IRR is positively influenced in 2.4% of all simulated funds and profit sharing is positively impacted from an investor's standpoint.

Underpinned by the presented quantitative analyses, this work demonstrates that subscription lines are more a convenient portfolio management tool that simplifies the operations for both the manager of the fund and its investors rather than an instrument to boost performance and obscure performance evaluation.

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