Private equity performance and asset allocation: impact of low rates and the J curve of cash flows

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Abstract

Private equity has increasingly been used in portfolio for all types of investors as family offices or retail ultra-high networth individuals. Financial Literature proposes different ways to compute private equity performances with results that can question the promised over-performance on public equities. The investment process in private equity funds with the system of committed capital and called capital can have a huge impact of the private equity performance in the whole portfolio. This paper proposes an empirical study that integrates the J curve effect and the low rate impact on the private equity part of a portfolio.

KEYWORDS: private equity performance, j curve, capital call, deposit rate, IRR, multiple on invested capital

JEL classification: G11

1 Introduction

The importance of private equity industry has been increasing since 2000. Committed amount has been growing from 10 bn USD in 1991 to 180 bn USD in 2000 (Jesse Reyes, 2002). With the exceptional turmoil in public equity markets in 2008, an impressive cycle of expansion started for private equity market. The fundraising private market compound annual growth rate (CAGR) between 2010 and 2015 is 15.1% according to Prequin, one of the most important private equity databases. The private asset's market size is close to 5.2 trillion USD (Mc Kinsey, 2018).

Private equity investing is set up with a limited partnership structure involving a general partner (GP) who is the manager and limited partners (LP) who provide its capital to invest in different private companies through the general partner. Traditionally, LPs consist in several type of investors: endowment plans, family offices, foundations, public pension funds, sovereign wealth funds and private pension funds. More and more high net worth retails investors have been investing in private equity funds. LPs commit to provide a defined amount of capital to the GP through a closed end fund with defined maturity. GP "calls" the amount in order to invest in the private firms he choose to invest after a deep financial and legal due diligence. Usually, the funds have a 10 or 12-year duration. The GP can call the capital during the investment period which is typically 4 or 5 years. The investment period follows terms and conditions, the GP cannot make any investments after this investment period. Then, we can draw 2 sub periods in a private equity funds investment cycle: the investment period on which the capital is called and the period on which the capital is repaid to investors with multiple committed capitals depending on the success of the different investments. The investment period is not necessarily finished when the GP starts to repay LPs. An investment made in year one can be exited in year 2 or 3.

A major drawback of private equity are the performance measures. Contrary to liquid assets like bonds or listed equities, private equity doesn't offer the possibility to have transaction base prices. The private equity 's performance is measured by the cash outflow and cash inflow of limited partners. With these cash flow amounts, we can measure multiple capitals, ie the ratio between the called capital and the repaid capital by the GP to LPs. In the partnership, investors (LPs) commit capital ex ante and fund managers (GP) call this capital at their own discretion during the investment period. GP calls capital when an investment is closed. In order to maximize IRR, capital should be called when GP can transfer it for an investment. With the same multiple, the "cash at work" period should be as short as possible to maximize the IRR. On an entire investment period, the called capital amount can be less than the committed capital. In reality, the called capital does not exceed 80-85% of the committed capital.

The performances provided by GP to LPs are measured from the effective invested capital by the GP and don't take into account the period between the date of commitment and the date on which the capital is called. On this period, LPs are committed to provide cash to GP after a fifteen days (usual market practice) capital call notice. This amount of cash can be from 0 to 100% of the committed capital.

This uncertainty brings the question of the private equity's integration in the asset allocation. The performances reported by GPs on private equity are often close to 10% or higher in terms of IRR. The over-performance on listed equities is an open debate. Harris, Jenkinson and Kaplan [2015] found that the median private equity fund outperformed the S&P 500 by 1.75% per year in the 90's and 1.5% in the 2000's. The return necessary to compensate the added risks of limited partners is widely viewed to 3% which brings close to 10%. This 10% private equity IRR is "made" during the "cash at work" period as it is measured between the cash inflows and cash outflows. The literature concentrates on this type of performance. We advocate that the ultimate performance to the investor should be considered more globally. The real performance of a private equity block on an asset allocation should take into account the return during the period before the cash is effectively invested by the GP, and including therefore the opportunity costs of the cash committed but not yet called. In that respect, showing the impact of the shape of the cash flow stream and the level of the opportunity costs seems crucial.

We can imagine different strategies to invest this cash before it is called. Ang, Chen and Phalippou [2013] shows the positive correlation with level of EBITDA multiple and a negative correlation with high yield credit spreads It could therefore be appropriate to find a liquid proxy portfolio to invest the committed cash before it is called by GP.

Nevertheless, in order to manage market risk and liquidity risk, it seems appropriate to invest the non-called cash in treasury fund or deposits with a very short duration. For the investors, the performance of private equity block should be measured taking into account the cash performance before the capital calls. This paper proposes a model in order to compute the effective performance of private equity block taking into account the period on which the cash is not called and invested by the GP.

The next section of this paper proposes a literature review on private equity performances. The third section will analyze the impact of J curve on the private equity performance. Finally, the last section presents the model results on which the deposit interest rate is integrated in the private equity performances.

2 Private equity performances - literature review

GP usually provide two type of performance measures. The first measure is the multiple of invested capital. The multiple divides in the first part the sum of all cash distribution and the value of "non-exited" investments (based on GP valuation) and in the second part the sum of all fund contributions by LPs. The second measure in the IRR computed from investor's effective cash inflows and cash outflows. For non-exited investments, IRR can also take into account the GP 's investments valuation.

In order to improve the benchmarking of private investments, Austin and Nickels [1996] propose a measure called "public market equivalent" (PME). The PME measure compares an investment in a private equity fund to an equivalent investment in the public market taking into account the investment time. It is a relative performance measure with respect to listed equities. PME exceeding 1 means the fund multiple at the end of fund's life is better than if the investor would have chosen listed equities.

Before Kaplan and Schoar [2005], the literature on private equity performance was quite restricted due to difficulties to find appropriate information on fund performances, due their private character. Kaplan and Schoar [2005] is a seminal paper on the private equity performances analysis. This paper uses Public Market Equivalent which ables to compare private equity performance fund to S&P 500 through IRR measure. The way they implement PME calculation able to compare effective cash outflow and cash inflow of private equity fund and the S&P500.

Authors conclude that average private equity funds return approximatively equals the S&P 500. This paper also opens the field of research on the persistence of returns which will be enlarged by other authors. Managers launch regularly new "series" to make sure investors in a given fund have had a similar lifetime in the fund. Nevertheless, investments are not dispatched through the various PE series of that manager but each investment is made regarding as an opportunity for one fund at a time. Therefore persistence is not a trivial issue. Kaplan and Schoar [2005] measure persistence with an AR(1) model for consecutive yearly funds pertaining to the same manager. They find a significant predictability from year to year. Authors also establish the positive link between fund size and GP's experience.

Korteweg and Sorensen [2017] measure the link between persistence of private equity firms returns and their skills. Ang & al. [2013] draw a private equity time series return based on limited partner cash flows for different type of funds. Then they propose a private equity decomposition into systematic and idiosyncratic components. They conclude a beta for private equity significantly greater than one with different level's exposure depending on the type of private equity sub asset class (buyout, ventures or real estate). The idiosyncratic portion of private equity return is assimilated to the private equity premium. They compare private equity performance to S&P 500 index from 1993 to 2010 and also conclude that private equity beats the listed index. This finding is consistent with Harris, Jenkinson and Kaplan [2014] and Robinson and Sensoy [2011]. Barber and Yasuda [2017] analyze the link between interim performance of fund and their fundraising capacity. The show that interim performance affects the fund's raising capacities.

The typical approach used by LPs is to benchmark IRR on their private equity investments to stock market indexes such as S&P 500 or Russel 300, plus 300 basis points. The risk premium of 300 bps remunerates additional risks and illiquidity of the private equity compared to listed equities. Do private equity offer this 300 bps risk premium is still an opened question. Appelbaum and Batt [2014] conclude the private equity performance based on IRR is higher than their performances based on PME. The funds' performance heterogeneity brings a difference between median and average performances of buyout funds. The median buyout fund outperformed S&P500 by about 1% per year whereas the average over-performances is closer to 2/2.5 % per year according to the finance economists.

3 The impact of the J curve on the IRR

The key concept we use in this paper for the private equity performance measurement is the J curve. The J curve represents the investor's cash inflows and cash outflows as a percentage of committed capital, on a timeline. The entire J curve is known only *a posteriori* after the fund closes. It depends on the investments and exits realized by the GP.

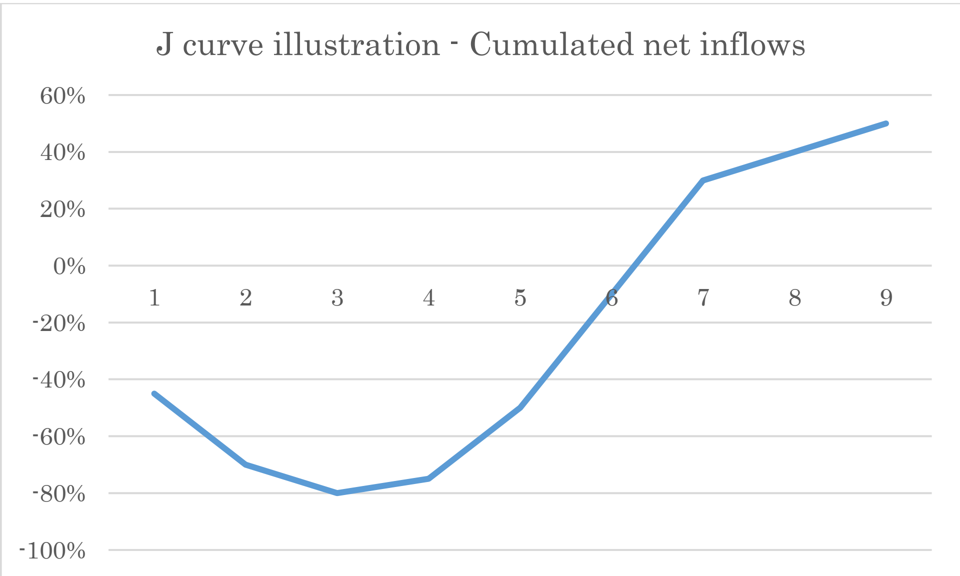
Table 1
Example of J curve to compute IRR
This table shows an example of J curve with yearly cash inflows and cash outflows in % of committed cash

Years	1	2	3	4	5	6	7	8	9	10
Cash outflows	-20%	-25%	-25%	-20%	-10%					
Cash inflows				10%	15%	25%	40%	40%	10%	10%
Total	-20%	-25%	-25%	-10%	5%	25%	40%	40%	10%	10%

Table 1 shows a typical J curve for a private equity fund. The cash outflows for investors or LPs range from year 1 to year 5. In year 4, the first investments that are exited provides cash inflows. In year 4 and 5, cash outflows and cash inflows provide a net positive cash inflow.

Graph 1

Exemple of J curve illustration



This example of J curve provides a multiple on invested capital of 150% and an IRR of 10.01%. The commonly accepted additional risk premium of private equity to public stocks is 2.5-3%. With a historical average S&P 500 return of 7.5%, 10% IRR is in line with the above private equity expected return.

The IRR measure only takes into account the "cash at work" period. The investor does not know when the committed cash will be called by the GP. GP makes capital calls at his pure discretion for each investment's closing. It is very difficult to have an idea of the path that will be followed by the capital calls. It can depend on several variables:

- **Market conditions**. For private equity the level of EBITDA multiple and credit spread are key variables to enter in a new company as a shareholder. The EBITDA multiple is taken into account in the company's valuation by the GP. Credit spreads reflect the price of leverage that could be used by GP to maximize its return on equity. In a low multiple and low credit spread, GP can decide to take investments opportunities faster than in conditions where multiple are higher and cost of leverage is expansive.

- **GP strategy**. Some GP need to be active shareholders for several years in order to implement their industrial transformation, re-organization or scaling strategies. Other GP have only a financial strategy that can be implemented in a short time.

- **Type of funds.** Secondary and co-investment funds usually call capital earlier than buy-out funds. Funds that have a high proportion of debt than equity also call capital faster.

As the speed of capital calls is completely unknown by the investor when he commits capital, it does not seem appropriate to allocate the uninvested committed cash to risky assets potentially returning a higher yield. Let's assume that 100 USD are committed to a private equity fund and they are invested in listed equity market waiting for the first capital call. With a 40% drop in listed equities, the remaining available cash for capital call would be 60%. The investor's asset allocation would deeply change if the GP calls 100 after the drop of 40%. It can be very interesting at this moment for the GP to call in order to lock investments in good market conditions. In order to manage credit risk, some GP request 100% cash deposit of the committed amount in a special pledged account.

At this stage, we assume that the cash committed by investors is invested in cash deposit with zero duration. Our models compute the IRR taking into account the fact that committed cash is "locked" in the whole asset allocation and invested in cash deposit. Then we can compute the "corrected" IRR with the same J curve including the cash inflows from the cash deposit as shown in table 2. In table 2, we assume a 3% deposit rate, the IRR is 7.97%.

Table 2
Example of J curve to compute corrected IRR with a deposit rate of 3%
This table shows an example of J curve with yearly cash inflow and cash outflows in % of committed cash

Years	1	2	3	4	5	6	7	8	9	10
Cash outflows	-20%	-25%	-25%	-20%	-10%					
Cash deposit	80%	55%	30%	10%	0%					
Cash inflows from cash deposit	2,4%	1,7%	0,9%	0,3%	0,0%					
Cash inflows from private equity				10%	15%	25%	40%	40%	10%	10%
Corrected IRR computation flows										
Cash outflows	-100,0%									
Total cash inflows	2,4%	1,7%	0,9%	10,3%	15,0%	25,0%	40,0%	40,0%	10,0%	10,0%
Total	-97,6%	1,7%	0,9%	10,3%	15,0%	25,0%	40,0%	40,0%	10,0%	10,0%

The deposit rate clearly influences the corrected IRR. Table 3 proposes the same IRR computation with different deposit rates. It's interesting to see that the deposit rate of the committed cash should be close to 10% (exactly 9.1%) in order for the "corrected" IRR to equal the private equity with a 10% expected return, for this J curve.

Table 3
Corrected IRR function of deposit rate
This table shows corrected IRR with different deposit rates

Deposit rate	0%	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Corrected IRR	7,05%	7,35%	7,66%	7,97%	8,29%	8,62%	8,95%	9,29%	9,63%	9,98%	10,33%

4 Modeling the combined impact of the shape of the J curve and the level of deposit rates

In this section, we will generalize our previous finding on the impact of the shape of the J curve by simulating many patterns. The model computes IRRs associated to different J curves taking into account the same MOIC (multiple on invested capital), defined here at 150% for the sake of illustration.

Multiple J curve patterns are drawn through Monte-Carlo simulations with a uniform distribution, for two different parts of the cash flow stream. The first part relates to the distribution of cash *outflows* from years 1 to year 5 considering a 5 years investment period. The total of cash outflows is fixed to 100 on the 5 years. The first-year cash outflow, CO1, is simulated with a uniform distribution from [1,100]. Then the second year cash outflow is simulated from [1,100 – CO1]. The following cash outflows are drawn the same way by reducing the size of the sample by the cash amount that has been already called.

The second part of the J curve is the distribution of cash *inflows*. We apply the same routine as for the cash outflow except that the total cash inflows is fixed to 150 and can be distributed from 1 to year 10. Also the model permits for cash outflows and cash inflows to occur on the same year between year 1 and year 5. Table 4 shows an example of a simulated J curve.

Table 4
Example of simulated J curve
This table shows an example of J curve drawing before permutation routine

Year	1	2	3	4	5	6	7	8	9	10
Cash outflows	-19%	0%	-5%	-75%	-1%					
Cash inflows	7%	0%	26%	0%	20%	22%	3%	18%	0%	54%

With this routine, the probability to have a concentration of high cash inflow and cash outflow in the first two years is high. In order to correct this bias, we propose 20 permutations of the initial J curve. Table 5 shows the example of a simulated J curve with permutations.

Table 5
Example of simulated J curve
This table shows an example of J curve drawing before permutation routine

	Cash inflows					Cash outflows									
Permutation number / Years	1	2	3	4	5	1	2	3	4	5	6	7	8	9	10
1	-19%	0%	-5%	-75%	-1%	7%	0%	26%	0%	20%	22%	3%	18%	0%	54%
2	-1%	-19%	-5%	-75%	0%	22%	18%	3%	20%	0%	26%	0%	7%	54%	0%
3	0%	-19%	-75%	-5%	-1%	0%	22%	0%	54%	18%	20%	0%	7%	26%	3%
4	-1%	-75%	-19%	0%	-5%	0%	0%	20%	18%	0%	7%	54%	26%	3%	22%
5	0%	-5%	-19%	-75%	-1%	54%	18%	22%	7%	0%	0%	0%	26%	3%	20%
6	-5%	-75%	-1%	-19%	0%	20%	7%	26%	0%	54%	22%	3%	0%	18%	0%
7	-1%	0%	-75%	-19%	-5%	18%	0%	22%	54%	0%	0%	20%	3%	26%	7%
8	-5%	-1%	-75%	-19%	0%	22%	0%	0%	0%	7%	3%	26%	54%	20%	18%
9	-1%	-5%	-75%	-19%	0%	0%	22%	26%	54%	0%	20%	7%	18%	0%	3%
10	-75%	-19%	0%	-1%	-5%	0%	0%	22%	20%	7%	3%	0%	18%	26%	54%
11	-75%	-19%	-5%	0%	-1%	0%	0%	20%	3%	54%	18%	26%	0%	22%	7%
12	-19%	0%	-5%	-75%	-1%	26%	3%	0%	20%	54%	7%	0%	18%	0%	22%
13	-75%	-19%	-5%	0%	-1%	26%	22%	3%	18%	0%	20%	0%	0%	7%	54%
14	0%	-5%	-1%	-19%	-75%	0%	20%	0%	54%	0%	7%	18%	26%	22%	3%
15	-1%	0%	-5%	-19%	-75%	0%	18%	22%	20%	0%	0%	54%	7%	26%	3%
16	-19%	-5%	-1%	0%	-75%	0%	3%	26%	22%	7%	54%	0%	20%	18%	0%
17	-75%	-5%	-19%	0%	-1%	22%	7%	0%	54%	26%	18%	3%	0%	20%	0%
18	-1%	-5%	-75%	-19%	0%	18%	20%	0%	0%	26%	54%	22%	7%	3%	0%
19	-5%	-75%	0%	-19%	-1%	0%	22%	54%	20%	26%	0%	18%	3%	7%	0%
20	-19%	-5%	-75%	-1%	0%	7%	0%	0%	26%	18%	20%	0%	54%	22%	3%

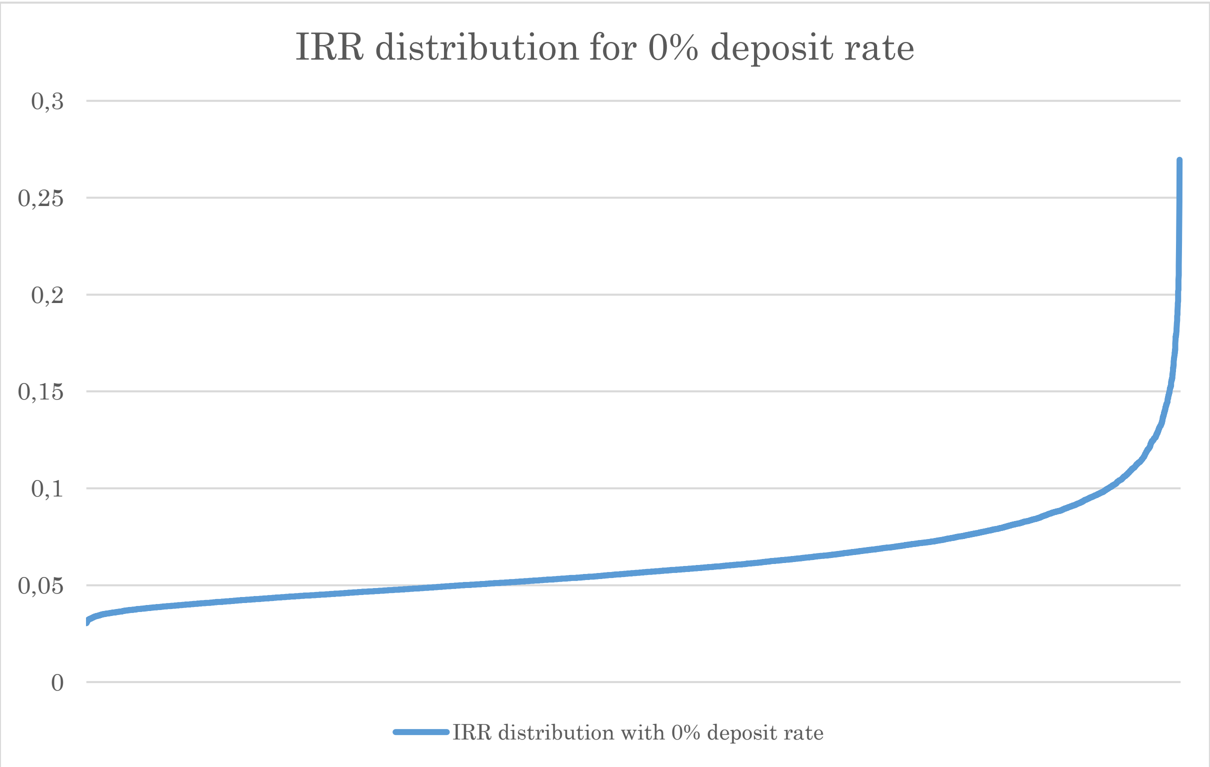
4.1 First results

We propose here below the results stemming from a simulation of 10'000 J curve pattern iterations. Table 4 shows the average per year of each cash outflows and cash inflows distributions.

Table 6
Average of simulated cash outflows and cash inflows
This table shows per year the average on the 10 000 J curve cash outflows and cash inflows

Years	Cash outflows	Cash inflows
1	-20,62	15,37
2	-19,87	14,57
3	-19,71	14,98
4	-19,89	15,12
5	-19,91	14,56
6		15,06
7		14,38
8		15,11
9		15,26
10		15,59
Total	-100,00	150,00

Graph 2
Computed IRR from simulated J curve
This graph plots the sorted IRR for the 10 000 simulated J curve



Graph 2 shows the distribution of the 10'000 IRR issued from the simulated J curves. The average IRR is 6.2%. More than 93% of the simulated IRR are below 10% which is the initial J curve's IRR. The IRR minimum is 3.04% whereas the maximum is 26.96%. These statistics show the importance of the J curve form on the IRR made by investors. In the next part, we integrate the investor's remuneration during the commitment period on which the capital has not been called.

4.2 Results with the integration of the revenue on the cash deposit

The previous section shows the importance of the J curve form in the IRR made by the investors as we assume that the investors made 0% return on the period between the commitment and the effective capital call by the GP. In this section, we integrate the return of cash deposit before the capital call. We assume that the capital call amount is known at the beginning of the year and the non-called amount is invested in a 1 year deposit. Then we integrate the return deposit in the cash flow streaming. The cash outflow is decreased by the deposit gain.

Table 7
Example of simulated J curve
This table shows an example of J curve drawing before permutation routine

Year	1	2	3	4	5	Total
Cash outflows without deposit	-19,00%	0,00%	-5,00%	-75,00%	-1,00%	-100,00%
Cash outflows with 1% rate deposit	-18,19%	0,81%	-4,24%	-74,99%	-1,00%	-97,61%
Cash outflows with 2% rate deposit	-17,38%	1,62%	-3,48%	-74,98%	-1,00%	-95,22%
Cash outflows with 3% rate deposit	-16,57%	2,43%	-2,72%	-74,97%	-1,00%	-92,83%
Cash outflows with 4% rate deposit	-15,76%	3,24%	-1,96%	-74,96%	-1,00%	-90,44%

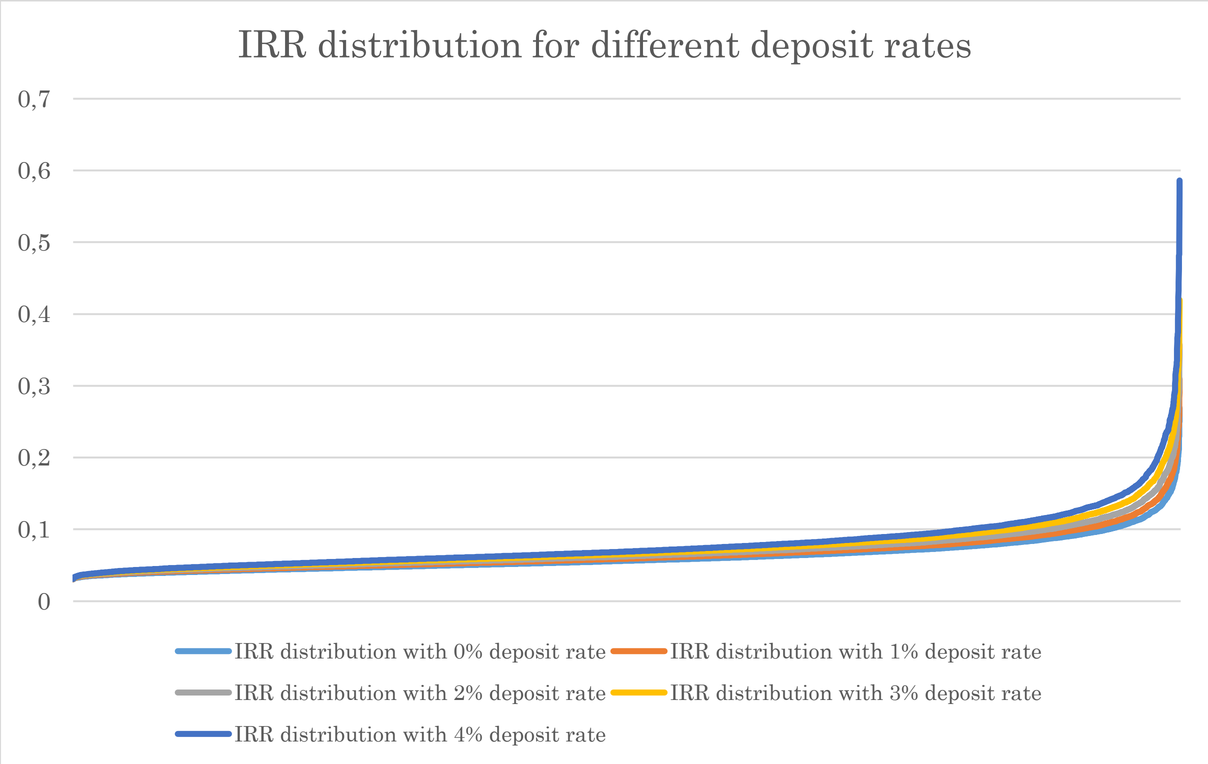
Table 7 details the previous example of cash outflows including the deposit for different interest rate from 1% to 4%.

Table 8
IRR distribution for different deposit rates
This table shows some descriptive statistics on IRR with different deposit rate

Deposit rate	0%	1%	2%	3%	4%
Min	3,04%	3,05%	3,07%	3,08%	3,10%
Max	26,96%	30,95%	35,74%	41,95%	58,62%
Average	6,20%	6,59%	7,02%	7,47%	7,98%
% below 10%	93,27%	90,67%	87,88%	84,58%	80,69%

Table 8 shows some descriptive statistics on IRR for different deposit rate. We see the high impact of deposit rate on average IRR which goes from 6.2% to 7.98%. We see in this table that below a 3% deposit rate, the private equity IRR does not even reach, in average, the 7.5% expected return of the public equities. Even with a 4% rate, more than 80% IRR are below 10% which is the IRR with the assumed J curve shape in table 1.

Graph 3
Computed IRR from simulated J curve and different deposit rates
This graph plots the sorted IRR for the 10 000 simulated J curve and deposit rates from 0% to 4%



5 Conclusion

This paper revisits the private equity performance taking into account the impact in the asset allocation of the amount committed by investors to GPs. A lot of existing literature relies on private equity performances like if it was on "stand alone". They don't take into account the fund manager's discretion to call the committed cash and nor its impact on the private equity performance in the global asset allocation. Our paper highlights the importance of the J curve shape in the private equity performance. During the investment period, the non-called committed cash is not allocated by investors and is "locked" with the deposit rates low yielding. Our paper analyses the combinate impacts of J curve shape and low rates environment. We conclude that the promised private equity over-performance on public stocks should be challenged taken into account these effects on the asset allocation and the high part of cash as a consequence of private equity commitment.

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