



Venture capital funds: Flow-performance relationship and performance persistence

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ARTICLE INFO

Article history:

Received 7 November 2008

Accepted 26 August 2009

Available online 1 September 2009

JEL classification:

G11

G24

G14

Keywords:

Venture capital

Performance

Performance persistence

Investor sophistication

ABSTRACT

This paper finds that venture capital funds that are expected to be backed by more skilled investors show no performance persistence but a significant flow-performance relationship. In contrast, funds that are expected to be backed by less skilled investors show performance predictability and have a non-significant flow-performance relationship. These results suggest that only skilled investors use all available information to adjust their capital allocation and, as a result, eliminate performance predictability as argued theoretically by Berk and Green (2004). Results also show that Kaplan and Schoar (2005) overstate the persistence in fund performance by not using an ex ante measure of the performance of earlier funds. Whether or not an ex ante measure is used, however, the persistence is largely due to unsophisticated investors. When investors are sophisticated, the performance of earlier funds, sequence and fund size do not help predict the performance of the focal fund.

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1. Introduction

Venture capital funds are structured as non-tradable 10 year long partnerships during which investors cannot change their capital allocation. Every two to five years the venture capital firm – which runs the funds – raises a follow up fund.

In the recent literature investigating venture capital as an investment vehicle, one of the most striking findings is that of performance ‘persistence’ by Kaplan and Schoar (2005).¹ They find that the performance of fund N_i is positively related to the performance of the fund N_{i-1} previously raised by the same venture capital firm. This result has had a large impact in the field as it presents a puzzle. Why do investors not adjust capital allocations to the point where persistence disappears? Why do funds not adjust fees to the point where persistence disappears?

Kaplan and Schoar (2005) conjecture that this result comes from the fact that top funds voluntarily restrict their size. This argument can be related to the Berk and Green (2004) model of mutual funds. Investors learn about the skills of a manager. Following good performance, they want to allocate more to the point

where expected performance of the top fund equals that of other funds. If funds limit their size, then persistence arises.

Hochberg et al. (2008) thoroughly model this argument and in particular endogenize the decision to limit fund size. They argue that incumbent investors have soft information about fund manager abilities on which they could “hold-up” the fund manager. The idea is that if the incumbent investors do not re-invest in the follow up fund, outside investors will think that the soft information is negative and, as a result, will reduce their allocation to the newly raised fund. The venture capital firm, therefore, needs to pay a rent to the incumbent investors and they do so by limiting their size, hence offering high expected returns.

Another recent paper by Glode and Green (2008) argue that it is not soft information about abilities that fund managers can be “held-up” with but information about their investment strategy. The same reasoning as above follows. Fund managers need to pay a rent to incumbent investors thus creating persistence.

This paper returns to the original empirical evidence. It starts with the observation that there is no evidence yet on whether investors rationally respond to past performance information or not. The finding that the performance of a 1988–1998 fund is related to the performance of a 1985–1995 fund does not indicate that investors have incorrectly reacted to available information in 1988. Nor does it say that the fees for the 1988–1998 fund were not appropriate. The same argument goes with fund size. The relation between fund size in 1988 and performance of the 1985–1995 fund is not indicative of how investors have reacted.

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¹ E.g., Metrick and Yasuda (2009) study fees; Cumming and Walz (2009), Kaplan and Schoar (2005) and Phalippou and Gottschalg (2009) look at performance; Cochrane (2005) and Driessen et al. (2009) measure risk.

This paper is the first to study the organizational structure of the venture capital industry by investigating both performance persistence and the flow-performance relation ex-ante.² The distinction between overlapping persistence and ex-ante persistence proves to be an important one. While data show that Kaplan–Schoar’s result of overlapping persistence is robust and of large magnitude, there is no evidence of ex-ante persistence. We also show that if we require a minimal spread of 6 years between the two successive funds, the persistence result vanishes.

The idea that there should not be any ex-ante persistence in the delegated money management industry stems from Berk and Green (2004) and is based on the assumption that investors learn rationally about manager abilities. It is then natural to create sub-sets based on investor learning capacities. This is not directly observable, but Lerner et al. (2007) show that some investors learn from neither private nor public information about VC abilities and that these investors back poorly performing funds. Therefore, their results suggest that fund performance is a good proxy for investor sophistication. Hence, we create sub-sets based on fund performance with the assumption that superior funds are backed by more skilled investors. Importantly, this means that we separate funds based on ex-post information. Later, we also show results when we separate funds based on ex-ante information (size and past performance). We expect the results to be more meaningful using fund performance than past performance for the following reason. In the model of Berk and Green (2004), if a firm has poor past performance, it will have a fair future performance if it sets the size of the newly raised fund to an appropriate level. A sophisticated investor may thus back a firm with poor past performance and obtains fair performance. What theory really suggests³ is that it is among the funds that perform well that the two predictions of Berk and Green (2004) should hold true. These two predictions are (i) among funds that perform well, there was a tight flow-performance relation when the fund was formed and, (ii) the information available when the fund was formed cannot be used to predict performance. In contrast, among funds that perform badly the predictions should not hold true. We should see that there was *not* a tight flow-performance relation when the fund was formed and, in addition, that the information available when the fund was formed *can* be used to predict future performance.

Looking at sub-sets based on fund performance is also interesting given the conjecture of Kaplan and Schoar (2005) to explain persistence. They argue that better performing funds voluntarily restrict their size and that creates persistence. This conjecture, therefore, suggests that the relation will be different for superior and inferior funds (performance-wise). The second contribution of the paper is then to investigate ex-ante performance persistence and the flow-performance relation *separately* for superior and inferior funds.

We find significant and robust ex-ante performance persistence for funds whose performance is *below* median but no performance persistence for funds whose performance is *above* median. Hence, better performing funds do not show any sign of persistence. Inferior funds, in contrast, do. Similarly, other ex-ante characteristics such as fund size and sequence are related to performance but only for the inferior funds. In addition, even if we measure past perfor-

mance ex-post (like Kaplan and Schoar, 2005), we obtain a similar result. It is the inferior funds that exhibit the strongest persistence. Thus, we show that Kaplan and Schoar (2005) simply overstate the persistence in fund performance by not using an ex ante measure of the performance of earlier funds. Whether or not an ex ante measure is used, the persistence is largely due to unsophisticated investors. When investors are sophisticated, the performance of earlier funds, sequence and size do not help predict the focal fund’s performance.

Next, we find no significant ex-ante flow-performance relation for funds whose performance is *below* median but a very strong and robust flow-performance relation for funds whose performance is *above* median. The flow-performance relation is as much as 10 times larger for better performing funds. Hence, better performing funds have a significant flow-performance relation. Inferior funds do not. We interpret these results as evidence that funds backed by more sophisticated investors show no performance persistence and significant flow-performance relation. In contrast, funds backed by less sophisticated investors show performance persistence and no significant flow-performance relation.

These results are in line with the theory we outlined above. There may be some funds backed by sophisticated investors for which Berk and Green’s (2004) predictions are validated and others backed by unsophisticated investors for which the predictions are not validated. This raises the question of who these sophisticated investors are and what they have that others do not. To our knowledge, two papers provide some answers. Lerner et al. (2007) identify banks and pension funds as the unsophisticated investors and endowments as the sophisticated ones. They explicitly attribute these results to banks’ and pension funds’ (i) rigid decision criteria, (ii) lack of a sufficient understanding of the asset class, (iii) inappropriate incentives (e.g. the limited compensation and autonomy that public pension investment officers enjoy, leading to frequent turnover), (iv) poor incentives (e.g. rewards from maximizing assets under management, even if they lead to deteriorating returns), (v) poor human resource practices (e.g. the rapid rotation of personnel in corporate pension funds), and (vi) conflicting objectives (e.g. banks may want to build a commercial relationship with a private equity firm). In addition, Lerner et al. (2008) report that endowments benefit from superior investment committees, more skilled investment managers, and better networks. This is the sort of soft information that sophisticated investors may use, in addition to publicly observable information (e.g. fund size, sequence and past performance).

Besides empirically documenting whether ex-ante information about past performance carries any predictive value, our analysis provides an ideal test for the theory of Berk and Green (2004). Venture capital funds and their investors need to think thoroughly once every 2–4 years about what the optimal fund size is. This is very different from mutual funds where fund size (i) is the result of a large number of uncoordinated, probably unsophisticated investors and (ii) changes daily. Therefore, fund size in venture capital is a rather ‘pure’ variable that can be linked to past performance, thereby appropriately testing Berk and Green’s model. In our setting, the Berk and Green model appears to capture first-order features of the venture capital industry.

The rest of the paper continues as follows. Section 2 presents the data. Section 3 covers performance persistence. Section 4 is dedicated to the flow-performance relation. Section 5 shows robustness and Section 6 concludes.

2. Data and hypotheses

We start by outlining our data source and the institutional framework particularly important for our empirical tests. Next,

² In a recent version of their working paper, Hochberg et al. (2008) also include ex-ante specifications. Their data enable them to work only with IRR and the maximum of all previous fund performance. In contrast, I will work with a present value based measure of performance (hence free of IRR pitfalls) and will aggregate all previous fund cash flows to get a better picture of firm total past performance.

³ A formal Berk-Green model with investors that are heterogeneous in sophistication is not derived here. The derivations are obvious from the Berk-Green model as long as we make an assumption that there exist unsophisticated investors defined as investors who do not learn in a fully rational way nor possess skills to select funds. This assumption is supported by arguments in Lerner, Schoar and Wongsunwai (2007) and Lerner, Schoar and Wang (2008).

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