
Exploration-exploitation dilemmas of venture capital funds: the role of organisational slack and horizons

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Abstract: This paper analyses the investment decisions of venture capitalists (VCs). Drawing on March's conceptual exploration-exploitation framework, we examine whether organisational slack and organisational horizons can predict exploration and exploitation behaviours. Using data on VC funds that operated in Israel between 1990 and 2004, we explore two central VCs' dilemmas: the first, whether to invest in startups at their seed stage, and the second – when to opt for an exit. We found that whereas organisational slack and time horizons predicted explorative performance, exploitation was found as more dependent on situational factors and more strongly associated with investors' pressure. The findings are discussed in terms of the limited ability of top management teams to maintain an optimal balance between exploration and exploitation in organisations in general, and in VC funds in particular.

Keywords: exploration vs. exploitation; venture capital; organisational slack; organisational horizons; Israel.

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1 Introduction

This paper explores how organisational slack and organisational horizons can predict investment behaviour of venture capitalists (VCs), who usually operate in an uncertain context and are subjected to a wide array of stakeholders and managerial constraints (Dickson and Weaver, 1997; Quindlen, 2000). It is important to understand the role of slack and time horizons in investment decisions of VCs because they are associated with two seemingly opposite strategies: exploitation and exploration (March, 1991). The special context of the VC industry depends to large extent on alternating between:

- 1 exploratory risk-taking behaviours, investing in startups in their early lifecycle stages
- 2 exploitative behaviours, taking advantage of ad-hoc opportunities and gaining immediate returns on risky investments (Rothaermel and Deeds, 2004).

Thus, measuring and understanding the relationship between exploitation and exploration in VCs may contribute to better assessing investment opportunities and future investment decisions (Sorenson, 2008).

Furthermore, we investigate two central VCs dilemmas. The first is whether to invest in a startup's seed stage, a decision that involves risk taking, experimentation or search behaviours, reflecting an exploration. The second dilemma concerns the timing of an exit, which incorporates execution, calculation, and implementation behaviours, all reflecting exploitation. By addressing these dilemmas, we intend to provide a better understanding of VCs strategy and policy towards the startup companies in their investment portfolios, and to capture the limitations of the exploration-exploitation framework when it is applied to organisations with unique characteristics such as VCs.

2 Exploration and exploitation strategies

During the last 20 years the distinction between *exploration* and *exploitation* processes in organisations has had a great impact on organisational behaviour and business strategy (see, Lavie et al., 2010; for a review). For example, many studies have been done on how the relative investment in exploration and exploitation strategies affects organisational performance (e.g., Rothaermel and Deeds, 2004; Bierly and Chakrabarti, 1996; Garcia et al., 2003; Gibson and Birkinshaw, 2004; Nerkar, 2003), or how organisations maintain a balance between these two activities (Gibson and Birkinshaw, 2004; Holmqvist, 2003; Jensen et al., 2006; Rothaermel and Deeds, 2004; Lavie and Rosenkopf, 2006; Rothaermel and Hess, 2007, 2008; Voss et al., 2008). March (1991, 1999), delineated exploration and exploitation as two independent dimensions of organisational behaviour, reflecting different organisational strategies, the first being associated with search, innovation, variation, risk taking, flexibility and experimentation, while the second is associated with risk aversion, systematic thinking, choice, selection, implementation, and execution. Whereas the common goal of exploration behaviours is the organisation's long-term survival (Levinthal and March, 1993), exploitation behaviours employ short-term thinking, stability and motivation to gain immediate returns on investment. Since exploration behaviours are relatively risky, they result in higher performance variability than exploitative behaviours. Whereas exploration behaviour is supposed to increase the likelihood of achieving a level of performance above or below the historical trend line, exploitation, the non-risky behaviour, is more likely to incrementally improve existing capabilities and efficiency or at least maintain past performance level (Lewin et al., 1999).

March (1991) described exploration and exploitation as two complementary strategies, essential for organisational survival and prosperity, suggesting that organisations should maintain a constructive balance between them. For example, excessive exploitation of existing technology may lead the firm into a '*competency trap*' (Levitt and March, 1988), which results in the risk of being locked out of opportunities in the long run. In contrast, excessive exploration over exploitation may lead the firm into a '*failure trap*' (ibid), that is, an escalation of efforts to change that may result in inefficiency and depletion of resources (see also Tushman and O'Reilly, 1996; Tushman et al., 1997).

The central factor likely to determine any strategic decision within the exploration-exploitation framework is how decision makers conceive the inherent tradeoffs between exploration and exploitation. Are they going to trade off short-term productivity for long-term innovation by allocating the organisational resources to various activities pursuing new knowledge and prospective opportunities? Or instead,

will they prefer channelling the organisational resources to address current needs such as shareholder pressures and managerial benefits? March (1991, 1999) suggest that two main variables determine the trade-off and eventually the balance between exploration and exploitation. The first is '*organisational horizons*', the organisation's tendency to adopt a long-range or distant future perspective. The second variable is '*organisational slack*', the organisational resources that are not committed to a specific target.

With respect to the first factor, March (1999) argued that the shorter the time horizon, the more the optimal balance shifts in favour of exploitation. Time horizon was defined by Elbert and Piehl (1973) as "... that distance into the future to which a decision-maker looks when evaluating the consequences of a proposed action". Time horizon is also associated with the concept of 'future time perspective', defined by Nuttin and Lens (1985) as the overall attitude towards time that focuses on the future. A future time perspective implies the belief that a behaviour performed in the present increases the possibility that a desired future goal will be attained, and thus leads to a higher valuation of goals having future attainment possibilities (Jones, 1988). One may argue, then, that organisations with far-reaching time horizons will tend to invest in pursuing long-term objectives.

The concept of organisational slack has received considerable attention in the strategic management and organisation studies of the last decade (Geiger and Cashen, 2002; Palmer and Wiseman, 1999; Sharfman et al., 1988). Organisational slack has been defined as the organisational resources that are not committed to a particular target and can be used in a discretionary manner by the organisation (Dimick and Murray, 1978; Nohria and Gulati, 1996). Researchers distinguish between available, recoverable, and potential slack resources (Bourgeois, 1981; Sharfman et al., 1988; Singh, 1986; Voss et al., 2008). Available slack represents resources such as cash funds; recoverable slack represents sources that have been absorbed by the organisation (e.g., excess overhead), but which can be recovered through increased efficiency; potential slack represents future ability to generate resources (raising additional equity capital). Organisational slack provides "... the cushion of actual or potential resources which allows an organization to adapt successfully to internal pressures for adjustment or to external pressures for change in policy as well as to initiate changes in strategy with respect to the external environment" [Bourgeois, (1981), p.30]. Slack protects the organisation from environmental and internal fluctuations (Cyert and March, 1963) and thus facilitates risk taking and fosters innovation (Singh, 1986). According to March (1991, 1999), organisational slack is an important antecedent of exploration. With an appropriate amount of slack, the perceived cost of failure is reduced (Rosner, 1968; Singh, 1986) and organisations can afford a variety of exploration activities such as innovation (Nohria and Gulati, 1996), risk taking (Singh, 1986), increased experimentation and decreased internal control that ultimately intensify innovation (Hambrick and Snow, 1977; Nohria and Gulati, 1996).

Interestingly, there is also evidence supporting positive relations between organisational slack and behaviours reflection exploitation strategy. For example, Mishina et al. (2004) found that the presence of slack can lead to cautious decision making and risk aversion, and Tan and Peng (2003) found that slack can increase incremental adaptation. Voss et al. (2008) trying to reconcile these contradictory results, suggested that the positive relations between slack resources and exploration is contingent upon the kind of slack and perceived environmental threats. In the face of a major competitive threat, the availability of unabsorbed slack steers the organisation

toward exploration, whereas the same resources stimulate exploitation when competitive intensity is mitigated.

Finally, another group of researchers argues that since inefficiency is associated with expanding the availability of resources (e.g., Jensen, 1993), surplus of slack might act to facilitate the creation of sub-optimal organisational systems, processes, and structures that reduce a firm's intensive exploration of new responses to environmental demands (Bourgeois, 1981; Yasai-Ardekani, 1986). Nohria and Gulati (1996) and Herold et al. (2006) suggest that the relationship between slack and exploration might be non-linear, namely that there might be an intermediate level of slack in any organisational setting that is optimal for materialising exploration strategies.

3 Venture capital funds

A venture capital fund is an institutional funding mechanism for entrepreneurial ventures at the pre-initial public offering (IPO) stage, and is considered to be a major contributor to the development of high-tech industries (Avnimelech and Teubal, 2004; Cooke, 2001; Hambrecht, 1980; Florida and Kenney, 1988; Gompers and Lerner, 1999, 2001; Kortum and Lerner, 2000; Schwartz and Bar-El, 2006, 2007). For many startups with no proven business experience, VC is a major source of financing. VCs generally provide financial backing that enables new ventures to grow and expand and eventually diversify their business strategies aimed to achieve desirable goals (from the investors' perspective) such as going public (issuing an IPO), or becoming a target for merger and acquisition operations.

VCs also assist with various business-related activities, including the development of business strategy, linking with potential partners and markets, and recruitment of the management team (Jain, 1999; Riquelme and Watson, 2002; Wasserman, 1988). In order to achieve their financial goals, VCs are deeply involved in the business processes of the enterprises they support, participating in designing strategy and business decision making (Lerner, 1995). VCs serving on the board of directors of startup companies are able to closely monitor their operations, evaluate actual progress against planning and to suggest the organisational changes that need to be made in the face of the dynamic developments in the competitive environment (Bygrave and Timmons, 1992; Hellmann and Puri, 2000b). VCs provide not only financial support to the young startups but also social capital in the form of access to pools of professional employees and managers, facilitating relations with prospective and relevant actors and providing respectability and prestige (Janeway, 1986). VCs' not only provide capital but also disseminate knowledge regarding technology and market, as well as by connections between founders and professional managers.

Despite the VCs' financial and managerial support to the new enterprise, the differences inherent in the nature of the partners are difficult to reconcile, rendering the prospects for smooth cooperation and alignment of mutual objectives rather shaky. In particular, VCs and startups may clash over business objectives, organisational priorities or strategic lines of action. VCs should therefore take into consideration a series of factors that have direct bearing on their ability to make knowledgeable decisions regarding their capital investments. For example, they should ask themselves at what stage of the lifecycle of the young startup it is best to invest. Should it be at the seed stage or should they take the plunge later when the future of the startup is less vague? Other

decisions to be made are when to halt the R&D process and go to market, when to exit, and when to close a failed startup.

Most venture capital funds are structured as closed, often ten-year, limited partnerships. Funds are typically not listed for trade on stock markets, nor do they disclose fund valuation information. A typical fund spends its first three or so years selecting enterprises for investments, which it then nurtures over the next few years (Ljungqvist and Richardson, 2003). Although VC funds are managed by a particular VC management firm, they are legally independent and treated as distinct business units. Typically, a VC management firm operates a single foundation at a time. Upon closing one foundation, the management firm may start recruiting capital for the next foundation. In cases where a VC firm has more than one fund, each fund may formulate an independent investment strategy and, eventually, build up distinct investment portfolios. In the same vein, each fund might have different managerial teams and different investors.

The VC fund organisation differs from ordinary organisations in several aspects that might have important implications for their exploration and exploitation behaviour:

3.1 Lifecycle and time horizons

Time horizons for VC funds are relatively short. Most are structured as closed, often ten-year, limited partnerships. Funds are typically not listed for trade on stock markets, nor do they disclose fund valuation information. A typical fund spends its first three or so years selecting enterprises for investments, which it then nurtures over the next few years (Ljungqvist and Richardson, 2003). Finally, funds are expected to respond to the investors' financial needs and to do their best to maximise the ROI in a relatively short time duration.

3.2 Slack resources

The slack resources of the VC fund are determined a priori. Once the financial resources are recruited and the fund starts to operate, it is impossible to obtain additional resources for investment either from internal or from external sources. Each additional investment decreases the available slack. Furthermore, in VC funds there is no sharing of resources between exploration and exploitation activities. VC management has a mandate to use the fund's slack for investments in new enterprises but they are not authorised to use the fund's profits for further investments. As a result, the decision-making processes in exploration and exploitation contexts are independent, that is, exploration and exploitation activities do not compete on the same organisational resources (as in other organisations). Finally, in the present study we relate to available slack (unabsorbed slack) only, because VC funds are not allowed to use their raised capital for organisational expenditures, they cannot sell existing startups for financing new investments, nor can they and raise additional equity during the VC funds' lifecycle.

3.3 Exit policy

Since exploitation in the VC industry presents occasional opportunities to exit, strategic considerations might fail to predict future behaviour. A factor such as organisational time horizon is relevant when decision making is a continuous process, such as planning the

investment strategy of the fund, but negligible in situations which call for rapid decision making in order to exploit an occasional exit opportunity and which are more dependent on external factors or even chance.

3.4 *External pressures*

The VC fund top management team is permanently under exploitation pressure from the investors. Fund investors are deeply involved, explicitly or implicitly, in all decisions about exploitation that pertain to the realisation of profits. These pressures might systematically bias management strategy toward exploitation. Given the potential influence of the investors in the VC fund on top management, we include the investors' effect in our models and examine their impact beyond March's predictors.

4 **Exploration and exploitation behaviours of venture capital funds**

We analyse two central VC dilemmas, whether to invest in startups at their seed stage, and when to opt for an exit, using data on VC funds that operated in Israel between 1990 and 2004. In what follows we describe in detail exploration and exploitation orientations regarding two main VC dilemmas.

4.1 *Exploration-exploitation dilemmas of VCs*

We study two VC dilemmas, both of which exemplify aspects of decision makers' conflicts involving exploration and exploitation. The first, the '*seed stage investment dilemma*', reflects contemplation about exploration and the second, the '*time to exit dilemma*', reflects contemplation about exploitation.

4.1.1 *The seed-stage investment dilemma*

A crucial strategic dilemma for VCs is whether to inject their initial investment in the seed stage of a given startup or in later investment rounds. Seed capital is the money used to facilitate a new product or service launch. It gets its name from the idea that early stage financing plants the seed that enables a small business to grow to maturity.

As seed investment entails risk taking, since it is made at the initial stage of development of the business in question, VCs naturally try to elicit any useful information to evaluate the future success of their potential startups, making a thorough study of technological and market developments (Fenn et al., 1995) and learning who are the founders of the enterprise and what are their business plans (Garmaise, 1999). By engaging in this time-consuming process of data collection and environment scanning, VCs lower their fund investors' costs of search and selection. Investors rely on the VCs to identify startups that give off signals predictive of future success, and to enhance the performance of startups that they select for funding (Baum and Silverman, 2004).

4.1.2 *The time to exit dilemma*

Exit is the most important signal of startup success, and actually the ultimate goal of the VC (Avnimelech and Teubal, 2004). Exit is the moment at which VCs share with their

investors the returns on their investment (ROI) in the particular fund. The relative number of exits in the VC portfolio and the accumulated ROI are good proxies for VC performance. High performance might guarantee future returns on investments in the VC firm. This is why VCs play such an active role in the exit decision (Lerner, 1994; Gompers, 1995). The dilemma is whether to exploit emerging but perhaps sub-optimal opportunities to offer portfolio startups to public investors, sell or merge the startups with more established conglomerates, or postpone the decision to a future time when exit conditions may yield superior profits.

Hellman and Puri (2000a, 2000b) found that startups supported by VCs were characterised by faster time to market. In terms of the present theoretical framework, the inclination of the VC toward achieving immediate ROI reflects its exploitation strategy.

4.2 Organisational time horizons in the context of the seed investment dilemma

VC funds (between and with VC companies) vary by the investment strategies they adopt. Whereas some of them choose to invest in new ventures in their seed stage, others prefer to invest in later investment rounds. The investment policy of each fund is transparent and usually published in the fund's website. According to Anderson (1999), a startup at the seed stage has no organisational experience or historical record on which VCs can rely to predict its future performance, and not only in financial terms: at the seed stage, the technological, organisational and environmental situation of the new startup is extremely uncertain and subject to material change. The VC fund management should have a long-range vision for investing its capital in startups at the seed stage. In other words, the longer the VCs' time horizon, the greater their tendency to invest in more preliminary stages of potential startups.

H1 Time horizon is positively related to the VCs investment in the seed stage. The longer the time horizon, the more the VC invests in seed as an initial participation investment round.

4.3 Organisational time horizons in the context of the time to exit dilemma

As already noted, a major VC dilemma is the timing of an exit. Is it preferable to cut additional risky investments in the new venture and to realise emerging ad-hoc exit opportunities, or continue with the current risky agenda until exit conditions yield more favourable profits? One may expect that VCs announcing their intentions to invest in a later financial recruitment round (i.e., having a short time perspective – narrow time horizons) will prefer to exploit immediate opportunities if they believe this will yield a future satisfactory harvest and improve their business reputation. By contrast, VC funds stating that they would rather invest in seed stages (i.e., having a long time perspective – wide time horizons) will tend to wait until the new venture matures and, by incremental refinements of its operations, reaches a satisfying level of performance. However, since exploitation in the VC industry presents occasional opportunities to exit, strategic considerations might fail to predict future behaviour. A factor such as the organisational time horizon is relevant when decision making is a continuous process, such as planning the investment strategy of the fund, but is negligible in situations which call for rapid decision making and which are more dependent on external factors or even chance. For example, it is impossible to predict purely exploitative actions such as exits through

mergers and acquisitions which depend on fortuitous opportunities. Thus, whereas exploration can be explained by strategic factors, exploitation can be better explained by tactical responses to contingencies. In sum, we expect that time horizon is negligibly related to time to exit.

4.4 Organisational slack in the context of the seed investment dilemma

A VC's slack represents its potential to invest in new business opportunities while buffering the VC fund from downside risk. Since seed investments are usually associated with innovative and risky ideas, a relatively high level of slack is essential: the greater the slack, the more VCs have the legitimacy to experiment with risky investments. Therefore, we hypothesise that:

H2 Slack is positively related to VC investments in seed money: the greater the slack, the more VCs invest in the seed stages of startups.

4.5 Organisational slack in the context of the time to exit dilemma

March's arguments that slack is related to exploration and exploitation strategies, and that organisations should maintain a constructive balance between them is based on two arguments: "[1] ... Both exploration and exploitation are essential for organizations but they compete for scarce resources. [2] organizations make explicit and implicit choices between the two" (p.115). March argues for the existence of a dynamic equilibrium between exploration and exploitation in the organisation and that this equilibrium is actively and deliberately implemented by the organisation's top management team. However, in VC funds, exploration and exploitation do not compete for the same resources. A VC's slack depends solely on the initial amount that the fund raised from its investors and its own rate of investments in new ventures. Slack is dedicated to investments in new ventures only. Over time, a VC fund's slack decreases and cannot be restored. When slack is depleted, the VC fund ceases its operations and a new fund is established. Revenues are not allocated for further exploration goals, but rather are transferred directly to the fund's investors or to management's compensation. Therefore,

- a exploitation decisions, such the timing of exits, do not depend on the available slack
- b management teams are constrained in their efforts to maintain the balance between exploration and exploitation.

The fact that the major portion of VC profits is realised after the fund ceases its operations, demonstrates the separation between the two capital resources. To sum, we argue that the predictors of exploitation in March's model are not relevant across contexts. More specifically, slack does not necessarily predict exploitation behaviours in VC funds.

4.6 VC fund investors and VC exploration-exploitation decisions

We assume that, as the fund management is not able to shift capital resources between exploration and exploitation activities, organisational slack is not related to the decision on time to exit. However, this implied limitation on the freedom of action of VC

management in balancing between exploration and exploitation warrants further investigation. To this end, we incorporate into our model factors that might have a direct influence on the VC fund management's autonomy in strategic decision making.

Given that the VC fund investors are the first to benefit from successful exits through their major share in ROI, it is expected that the fund's immediate stakeholders will have a dominant influence on the decision to opt for an exit. Moreover, investors are inherently biased toward exploitation behaviour because the entrepreneurship or innovations of the startup are merely the means to accrue financial profits. It is expected that the fund's investors will exert strong pressure to bias management strategy in favour of exploiting emerging exit opportunities.

Studies on corporate governance demonstrate that investors' control of the firm's decision makers depends on the concentration of ownership (Berle and Means, 1932; Mizruchi, 1996, 2004; La Porta et al., 1999). When the structure of ownership is diffused, and characterised by multiple minor investors, capital owners have less potential influence on daily managerial decisions. The composition of ownership is also significant. Investors with relatively high political or financial power (i.e., large banks, pension funds, or insurance companies) can exert more pressure on top management teams to channel their strategies in a way that benefits their own financial interests (Blair, 1995; Useem, 1996). Investors who hold large shares of the fund's total managed capital have a strong interest in influencing the strategic decisions of the fund's management team to ensure rapid high ROIs. Investors can control their funds by exerting direct pressure on managers, which restricts the latter's degree of freedom in decision making.

We argue that the less diffused the VC fund's ownership structure, that is, the smaller the number of minor investors in the VC fund and the greater the potential power of a small number of key investors, the shorter the time elapsing between the fund's initial investment in a given startup and its date of exit.

H3 Investors' influence on a VC is related to time to exit: the greater the investors' potential pressure on the VC, the shorter the time to exit.

In contrast to the significant involvement of the fund's investors in exploitation considerations regarding time to exit, we expect to find a negligible relation between the power the investors wield and the VC fund's seed-stage investments. As financial intermediaries, VC funds serve as indirect selection systems for their investors (Baum and Silverman, 2004), who rely on their VCs to identify the most promising startups for them, even if those startups are at their seed stage, when assessments of future success are almost impossible. VCs that succeed in meeting these expectations guarantee their investors lower failure rates (Baum and Silverman, 2004). Therefore, we do not expect to obtain a significant relationship between the level of influence the VC fund investors wield and the fund's investments in seed.

5 Method

We studied the exploration-exploitation dilemma in the context of the venture capital sector in Israel. This sector emerged in the early 1990s and grew rapidly from two to over 100 VC funds. During this period, the high-tech industry accounted for an increasing share of the business sector, reaching one of the highest levels worldwide (Avnimelech and Teubal, 2004).

Our data comprises a list of all 89 VC firms that operated 156 funds in Israel between 1990 and 2004. Of all the VC firms, 58 had 1 fund, 13 had 2 funds, 11 had 3 funds, 5 had 4 funds, 1 had 6 funds, and 1 VC firm operated 13 funds. Of these funds, 104 were still active in 2004, 50 were already fully invested and two had ceased to operate. Data was taken from the Israel Venture Capital (IVC) Research Center and the websites of the startups and VC firms. This database provided us with information on 134 (of the 156) funds. It should be noted that 40 funds did not have any investments in the seed stage and 46 funds had not performed an exit before July 31st, 2004, thus practically decreasing our sample size. To exclude rival explanations for our findings, we compared the included and not included funds on major relevant variables and found no systematic differences between them. Descriptive data on the VC firms and funds are presented in Table 1.

Table 1 Descriptive data on VC firms and funds

	<i>Mean</i>	<i>SD</i>	<i>N</i>
<i>Capital in million \$</i>			
VC firms	176.57	225.57	75
Funds	139.42	494.25	143
Funds' lifecycle in months	61.29	103.71	150
Number of investors per fund*	6.74	6.27	131
<i>Portfolios' composition per fund</i>			
Current	8.68	7.42	135
Exits	3.60	4.75	135
Ceased operations	2.33	2.88	135
<i>Percentage of portfolios according to industrial sectors</i>			
Communication	36.18	23.98	135
Life sciences	21.49	26.57	135
Internet	7.81	10.21	135
IT and enterprise	22.96	19.85	135
Other	11.18	14.10	135

Notes: *In most cases VC firms provide the exact number of relatively major investors. In cases where a small number of minor private investors were involved, VCs usually did not provide the exact number of these investors. In such cases we added 1 to the number of investors per fund.

5.1 *Dependent measures*

Two dependent variables were calculated to measure both exploration and exploitation behaviours of VC funds. Exploration is given by the fund's dilemma of how to invest its managed capital, and exploitation by the dilemma of realising previous fund investments. We developed one measure for each strategy:

- *Seed investment* – the percentage of a fund's investments in seed as initial round participation.

- *Time to exit* – mean elapsed time (in months) between the fund’s initial investment date in a startup and the date of that startup’s exit. In cases where startups went through more than one exit, we calculated *time to exit* using the first exit.

Data on initial rounds of VCs’ financial participation were taken from IVC data files. The categories of this variable are:

- 1 seed
- 2 first round
- 3 second round
- 4 third round
- 5 fourth round
- 6 PIPE
- 7 others.

As already noted, we used the initial participation rounds only since they best reflect the initial commitment of the fund to the startup firm. Seed stage investments are substantively different from all other investment rounds, since they entail high levels of risk taking and experimentation.

5.2 *Independent measures*

The three independent variables described below represent organisational slack, organisational time horizon, and the power that investors yield.

5.2.1 *Relative slack*

The ratio between a fund’s capital available for investment and the fund’s total managed capital, at a given point in time. This measure was calculated for two specific time points: first, when the VC fund invests in a seed round, and second, when fund’s portfolio startups perform an exit. Two limitations of this measure should be noted. First, VCs do not always provide information on their available capital, which explains missing values for this measure (55 out of 156). Second, as already noted, the IVC data files were updated to July 2004. Thus, information on the exact amount of available capital at the exit date of each startup or at the dates of the fund’s participation in seed investments was not always available. To achieve the best approximation for fund slack at the time of exit, we performed the following calculations:

- 1 We calculated the fund’s duration (see below)
- 2 The mean pace of investment, that is, the mean rate at which the slack of each fund was reduced, which is the difference between the fund’s managed capital and the available capital in July 2004, divided by the fund’s duration. Had we known the exact investment amounts at each point in time, a more accurate function of investment pace might have been constructed. Given the confidential nature of such data, we used the mean rate of investments as our best proxy.

- 3 We calculated the mean time elapsed from the fund's date of establishment or from the date of its first investment (when initial investment was made prior to the formal establishment date) to the portfolio startup's exit date.
- 4 Finally, we calculated the measure of relative slack, as follows:

$$\text{Relative Slack at Exit Day} = \frac{[(\text{total_managed_capital}) - (\text{rate}) \times (\text{elapsed_time})]}{(\text{total_managed_capital})}$$

For fully invested funds, slack was zero on the 31st of July 2004. For exits that occurred after the fund was fully depleted, slack remained zero. For funds with exits before the fund was fully invested, we calculated relative slack scores according to the procedure described above.

The above procedure was also applied to compute the measures of relative slack at the time of fund's participation in seed investments. *Relative Slack at Seed Investment Date* was calculated using the same formula, the only difference being that elapsed time was computed in the following way: (*date of seed investment – date of fund's establishment*).

5.2.2 *The power that investors wield*

This measure reflects the potential influence investors might have on the VCs autonomy in decision making. We assume that when the fund's total managed capital is raised from multiple minor investors, each of these investors has relatively little ability to influence the VCs decisions. In contrast, the influence that a few major investors with large shares in a single fund are able to wield in persuading the fund's management to prefer short-term investment realisation options may be very strong. Since VC funds do not reveal the exact amount invested by each of the investors, we chose the number of investors per fund as our proxy for investors' potential power. To improve the accuracy of this measure we ascribed different weights to large institutional as opposed to private or individual investors. Large institutions (i.e., banks, pension funds) were counted as a single vote, whereas all small individual investors were counted jointly as a single vote.

5.2.3 *Organisational time horizon*

The fund's time horizon is not, by any means, equivalent to the fund's age. The time horizon of a VC fund better reflects its tolerance for uncertain distant returns on its investments (see Levinthal and March, 1993). There are funds that realise their profits before their closure and there are funds that realise the ROIs years after they have ceased operations. The degree of tolerance is reflected in the VC's declaration to its potential stakeholders regarding its intentions to invest in different investment rounds. Although the declared intentions are supposed to guide the VCs investment strategy, financial and environmental conditions do not always allow organisations to materialise their initial vision (Landau et al., 2006). In sum, VCs differ in their intentions to pursue the long-term objectives, but whether they materialise these intentions, is still an empirical question.

Information on the fund's inclination to invest in a particular round, in the form of intention statements to its potential investors, was drawn from IVC data files. The earlier the preferred investment stage, the longer the fund's time horizon. Since the Israeli VC sector is characterised by a tendency to invest in early rounds (Khanna and Yafeh, 2005),

we further distinguish between funds that declared their preference to invest in seed rounds and funds that declared their preference to invest in other rounds, or had no preferences.

5.3 Covariates

- *Fund duration*: We calculated the lifecycle duration of each fund, defined as the time in months elapsed from the year the fund was established or from its first investment (if the first investment occurred before the formal establishment of the fund) to the date on which the fund ceased operations. For active funds, lifecycle was defined as the time in months elapsed from the year the fund was established, or from its first investment, to July 31st, 2004. If the date of establishment was given in year form only, we used the midpoint of the year (June 30th).
- *Distribution of risk behaviour*: The diversity of initial participation in investment rounds was computed as the standard deviation of the distribution of percentages in each of the seven initial-round participation categories, for each fund. High diversity implies an unclear strategy regarding the initial investment round. This variable reflects the noise surrounding the preferred investment round, and is supposed to reduce error variance.
- *Total managed capital*: Since the effects of our independent variables might differ across different fund sizes, a fund's total managed capital in USD millions was selected as a covariate.

6 Results

We begin by addressing two problems that potentially jeopardise the regression assumptions: number of funds nested within each VC firm (ranging between 1 and 13), and inter-fund dependency.

- *Funds nested within a VC firm*: Insofar as funds are independent SBUs that are operated by VC management firms, our sample unit was the VC fund (rather than the VC firm). In our sample, the majority of VC firms operated a single fund. When several funds are managed by the same VC firm, a certain dependency between nested funds might exist, which ultimately jeopardises regression assumptions. However, variance between VC funds nested within VC firms might be even greater than the variance between VC firms. Funds may be differentially affected by internal as well as external forces: each fund is dominated by a different combination of investors, has a different amount of total managed capital, a different type of financing, different declared investment preferences pertaining to stage, industry and location, and it may operate under different market conditions within a different profile of organisational populations.
- *Inter-fund dependency*: Many startups are financially supported by several funds concurrently, which cause inter-fund dependency.

To adjust for these dependencies, we took the following steps. (1) We constructed two data sets, the first containing funds that had at least one exit, and the second containing

funds with at least one seed-stage investment. For each data set we created N-1 dummy variables. The regression coefficients of the dependent measures on the dummy variables (without constant) provide the mean startup scores within each fund. As noted, the majority of startups had more than one score on the dependent measure, depending on the number of funds invested in them. In the next step (2), we recoded the dummy variables in such a way that each startup received a score of 1 for each of the investing funds. Thus, instead of assigning '1' to the one fund with which the startup was associated and 0 to all the others, we assigned 1 to all the funds that invested in the particular startup. The new set of dummy variables thus reflected the dependencies among the funds. The new *b* coefficients, therefore, provided new mean scores corrected for the dependencies among the funds.

Finally, in order to normalise the distributions of residuals we used $\log_{10}p_j$ as our measure in the statistical analyses. The statistical analyses for each of the research hypotheses are presented below.

6.1 The investment in seed dilemma

Table 2 presents the means, standard deviations and inter-correlations between the independent variables, time horizon (declared stage preferences), relative slack at the seed investment date, fund governance structure (number of investors), and the dependent variable (percentage of first round in seed as initial round participation). Table 3 displays the results of the hierarchical regression analysis performed to test H1 and H2. Whereas the first regression model includes the control variables only, the second model includes both the control and the independent variables.

Table 2 Descriptive statistics and correlations

	<i>Mean</i>	<i>SD</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>
1 Time to exit (in months)	12.25	12.25								
2 Percentage of seed round investments	18.40	18.40	.424**							
3 Fund's duration (in months)	61.29	61.29	.316**	-.038						
4 Diversity of investment round investments	21.06	21.06	.135	-.031	-.056					
5 Fund's total managed capital	140.05	140.05	-.183	-.148	-.03	.109				
6 Stage preferences ^a	.49	.49	-.045	.362**	.048	.124	-.14			
7 Relational slack (at date of seed investment)	.657	.657	.296*	.215	.125	.247*	.163	.063		
8 Relational slack (at date of exit)	.19	.19	.072	-.104	.45**	.026	.06	-.28	.57**	
9 Number of investors per fund	6.78	6.78	.158	-.068	.104	-.294**	.03	.017	.090	.35**

Notes: ^aSeed = 1, others = 0

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; two-tailed tests.

Table 3 Summary of regression analysis results

	<i>Percentage of investment in seed</i>			
	<i>Model I</i>		<i>Model II</i>	
	<i>Beta</i>	<i>t</i>	<i>Beta</i>	<i>t</i>
Fund's duration	-.28*	-2.26	-.29*	-2.47
Diversity of investment round investments	.19	1.47	.11	.80
Fund's total managed capital	-.15	-1.20	-.11	-.72
Time horizon	-	-	.27*	2.28
Relational slack	-	-	.28*	2.34
Number of investors per fund	-	-	-.06	-.37
	Adj. $R^2 = .13$ $F_{(3,59)} = 2.96^*$		Adj. $R^2 = .29$ $F_{(6,56)} = 3.74^{**}$	

Note: * $p < .05$; ** $p < .01$; *** $p < .001$.

The statistical analysis yielded a significant regression model. Consistent with our expectations, our two hypotheses (H1 and H2) were supported by the regression analysis. It yielded significant positive regression coefficients of percentages of investments in seed as initial round participation on time horizons and relative slack. As expected, the regression coefficient of number of fund investors was not found to be significant. Thus, the funds that had higher percentages of investments in seed as initial round participation were those funds that had longer time horizons. Funds having more relative slack at the seed investment date allocated greater shares of their fund's capital to early investment rounds. Following Nohria and Gulati (1996) and Herold et al. (2006), we also tested the curvilinear effect of slack on percentages of investments in seed as initial round participation. Since the regression coefficient of the quadratic coefficient was found to be non-significant, it was excluded from the model.

6.2 The time to exit dilemma

Table 2 presents the means, standard deviations and inter-correlations between the independent variables, time horizon (declared stage preferences), relative slack at seed investment date, fund's number of investors, and the dependent variable (time to exit). Table 4 displays the results of the hierarchical regression analysis performed to test the effect of our three independent variables on time to exit. Whereas the first regression model included the control variables only, the second model included both the control and the independent variables. As in the previous regression analysis, we also tested the curvilinear effect of slack on time to exit. Since the regression coefficient of the quadratic coefficient was found to be non-significant, it was excluded from the model.

Although the two regression models were found to be significant, not all the regression coefficients of the independent variables were significant or in the expected direction. In accord with our third hypothesis (H3), the regression analysis yielded a significant positive regression coefficient for number of investors. That is, the stronger the investors' potential pressure on VC decision making, the shorter the time to exit. As

expected, time horizon did not have a significant effect on time to exit. Contrary to our expectations, the β coefficient (standardised b_s) of relative slack was significantly and negatively related to time to exit, implying that this predictor might have a suppression effect on time to exit. Other β coefficients of our predictors, such as number of investors and fund duration, also showed a suppression effect, since the absolute values of their β coefficients were higher than their simple *Pearson's r* correlations with the dependent variable (time to exit).

To understand the meaning of the suppression effects one should understand that each independent variable is related to the dependent variable both directly and through other independent variables:

$$r_{yj} = \sum_{a=1}^k r_{ja} \beta_a \quad (a \text{ is an element of } x).$$

X_j is involved in suppression if and only if the sign of the sum of 'indirect' contributions is different from the sign of β_i (β_i is not zero). In our data, the significant negative correlation between relative slack and time to exit does not reflect the true direct relations with time to exit but rather indirect effects via other independent variables.

Table 4 Summary of regression analysis results

	<i>Time to exit</i>			
	<i>Model I</i>		<i>Model II</i>	
	<i>Beta</i>	<i>t</i>	<i>Beta</i>	<i>t</i>
Fund's duration	.49**	4.01	.63**	4.23
Diversity of investment round investments	-.02	-.14	.03	.21
Fund's total managed capital	-.165	-1.39	-.19	-1.56
Time horizon	-	-	-.06	-.49
Relational slack	-	-	-.32*	-2.02
Number of investors per fund	-	-	.25*	1.97
	Adj. $R^2 = .25$ $F_{(3,52)} = 7.53***$		Adj. $R^2 = .37$ $F_{(6,49)} = 4.75***$	

Note: * $p < .05$; ** $p < .01$; *** $p < .001$.

7 Discussion

The goals of the present paper were to analyse VCs' decisions in terms of March's exploration-exploitation conceptual framework and to discover whether the same antecedents, organisational slack and organisational horizons, can predict both exploration and exploitation. Two central VC dilemmas were analysed. The first dilemma requires a decision on whether to invest in a startup's seed stage. This decision involves risk taking, experimentation or search behaviours, reflecting an exploration. The second dilemma concerned the timing of an exit. This dilemma incorporates execution, calculation, and implementation behaviours, all reflecting exploitation.

Regarding exploration, it was found that relative slack and organisational horizons predicted VCs' percentages of investment in startups in their seed stage. With respect to predicting exploitation, however, the role of organisational slack and horizons remains equivocal. According to our hypotheses, there was no significant relation between organisational horizons and time to exit. The regression coefficient of relative slack was found to be significantly and negatively related to time to exit. However, it was shown that relative slack reflected a suppression effect and that its simple correlation with time to exit was positive but not significant. In summary, we found that whereas March's model significantly predicted exploration behaviour, it failed to predict exploitation.

The fact that March's model was not useful in predicting exploitation can be explained in three non-mutually exclusive ways. First, as noted above, in VC funds there is no sharing of resources between exploration and exploitation activities. VC management can use the fund's slack for investments in new enterprises but they cannot use the fund's profits for further investments. As a result, the decision-making processes in exploration and exploitation contexts are independent. In other words, current profits do not support long range planning in VC funds strategic decision making. This may explain why March's argument that exploration and exploitation activities compete on the same organisational resources is not always valid.

Second, since exploitation in the VC industry involves occasional opportunities to exit, *strategic* considerations fail to predict time to exit. A factor such as organisational time horizon is relevant in organisations that are relatively stable and have a clear picture of their long and short time period projects and objectives. Time horizon has little impact in situations which call for rapid decision making and which are affected more by external factors or chance. For example, it is impossible to predict purely exploitative actions such as exits through mergers and acquisitions which depend on fortuitous opportunities. Thus, whereas exploration can be explained by strategic factors, exploitation can be better explained by tactical responses to contingencies.

Third, March's model may have excluded factors that more strongly dominate VC management exploitation decisions. In the present study, the number of investors per fund (and not capital slack or time horizons) played a significant role in predicting exploitation behaviour. That is – fund investors are deeply involved, explicitly or implicitly, in all decisions about exploitation that pertain to the realisation of profits. It seems that when immediate exploitative decision making is required, what matters are the interests of the investors.

The common denominator of these three explanations is the inherent inability of the VC fund's top management to control the balance between exploration and exploitation. Given that:

- a there is no unrestricted sharing of resources across contexts of exploration and exploitation
- b crucial decisions may be determined more strongly by emerging pressures than by strategic plans
- c external stakeholders may channel management's policy to benefit their own interests, the question arises of the extent to which declared organisational strategy effectively represents an optimal balance between exploration and exploitation.

Although VC funds differ in their characteristics from other organisational forms, the inherent inability of top managements to efficiently balance between exploration and exploitation is relevant for other organisations as well. Any a-priori financial commitment of an organisation to external or internal interest groups or individuals restricts its autonomy in allocating valuable resources, and ultimately curtails its ability to balance between exploration and exploitation. However, the constraints on organisational autonomy in balancing between engaging in exploration or exploitation vary at different levels of environmental uncertainty, and at different levels of governance structure concentration. If environmental uncertainty is defined as “the inability of a firm’s managers to accurately assess the external environment of the organization or the future changes that might occur in that environment” (Dickson and Weaver, 1997), then in more uncertain environments, organisational decision makers are less able to balance between commitment to their exploratory strategic policy and responsiveness to exploitative tactic choices.

In addition, different levels of ownership concentration affect the management’s degree of freedom in balancing between exploration and exploitation. The more capital owners have a stake in controlling and coordinating their firms (for example, by direct intervention in management or through appointing representatives to the board of directors), the greater the tendency of top managers to deviate from purely strategic considerations in order to balance between exploration and exploitation.

In summary, maintaining an optimal balance between exploration and exploitation in organisations is a key strategic managerial issue. In line with recent studies (e.g., Greve, 2007; Lavie and Rosenkopf, 2006; He and Wong, 2004), this study has shown that the ability to reach an optimal equilibrium between these two strategies is embedded within the specific context, and affected by internal as well as external contingencies.

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