

# Venture Capital Firms' Specialization, Differences and Complementarities

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## Abstract

The paper analyses the differences in venture capital (VC) firms, proposes a classification of the firms and empirically investigates their investment and co-investment behaviour. The VC firms are not homogeneous and beside funds they possess a diverse set of nonfinancial resources which they optimize. A classification is developed based on VC firm resources and specialization represented by organizational form and affiliation. Based on Australian market data, we classify the VC firms in three categories, namely strategic, financial and independent using resource based theory, and highlight differences. Then the firms' specialization is related to their portfolio characteristics to identify and analyse differences and complementarities in terms of investment strategies. The influence of specialization in investment and co-investment strategies is also analysed. This study shows that specialization influences investment decisions and co-investor selection. Implications of such investment practices on resource efficiency, financial viability and transition to sustainability are also discussed.

**Keywords:** venture capital, firm resources, specialization, co-investment syndication, industry sustainability

**JEL Classification:** G24, L14, L21, M14, O56

## 1. Introduction

In the last few decades venture capital (VC) backed enterprises have brought many innovative products and processes to the market. This has helped many start-up and expanding companies in situations when bank debt had not been available to them. Success stories such as Apple, Google, Cisco, FedEx, YouTube and Facebook raised the profile of the VC industry across the world. Venture capital has eventually attracted various individual and institutional investors such as high net worth individuals, family funds, corporations, private and public pension funds, university endowment funds, government funds as well as banks and non-bank financial institutions. Investors from various backgrounds come with different investment objectives, preferences, risk profile, time horizon and strategic orientation. Venture capital fund managers also known as venture capitalists (VCs) who run the venture capital firms (VCFs) would usually raise funding from different clusters of compatible investors to invest and manage the funds for a fee and carried interest under agreed conditions (Sahlman, 1990; Gompers & Lerner, 2004; Wong, 2006). Different investors and funds with different investment focus contribute to the various layers of the entrepreneurial development in the national and globalized economy.

It would thus be logical to expect that VC fund managers organize and invest funds in areas where they have expertise and competitive advantage. For example, investing in enterprises at their early stage comes with a significant risk. The VCs would require relevant industry expertise to assess and manage the investment risk. Similarly, investment in the later stages would require larger fund availability as equity prices would be higher for more mature ventures. Thus, the VC investment focus in terms of venture stage as well as sector and location would be consistent with VCFs' resources. Furthermore, investment in and management of many ventures may require expertise and resources which could be provided better by more than one VCF. Therefore, VCFs would not only select portfolios according to the firm resources but also seek co-investment partners for the complementary resources necessary for the portfolio selection and growth. Co-investment in ventures connects VCFs in tangible networks which could facilitate the flow of information and resources across the industry. In this paper we develop a classification of VCFs according to their specialization and empirically investigate specialization-based investment and co-investment strategies using Australian market data. Specialization-based investment strategies and related management practices have influenced the industry's development, integration and continuity. The issue about the VC industry's viability has come under close scrutiny especially since the

2008 global financial crisis (GFC). This renewed the need for reviewing and reinforcing good industry practices. Hence, in this paper we also aim at understanding the best practices of the industry and its role in enterprise development.

A resource-based approach to understanding the firm indicates that VCFs require two critical resources, namely financial and nonfinancial (Lockett & Wright, 2001). The firms may focus more on the financial position, industry expertise or both. Accordingly, we place the VCFs in three categories, namely financial, strategic and independent. Several hypotheses about the investment and co-investment syndication strategies of these three types of VCFs are tested using a dataset from Thomson Reuter which provides details on VCF profile, investment amount and dates, investee company stage and industry information in Australia (Venture Economics, 2009). Using *probit* models we test these hypotheses and validate the predictions. Finally, we discuss the implications of specialization based investment and syndication strategies of firms with reference to good industry practices and the Australian venture capital industry.

## 2. Literature

Identifying the fundamental difference among VCFs is central to understanding entrepreneurial finance (Hellmann, 2002; LiPuma, 2006). Nonetheless, the VC literature has provided very limited coverage of VCF diversity. Traditionally VC investment vehicles are formed as limited partnerships managed by a group of independent VCs who raise funds and manage the portfolio on behalf of the investors (Gorman & Sahlman, 1989; Sahlman, 1990). Thus, VCFs involved in active fund raising have received attention from researchers as the mainstream firms for such activities (Hellmann, 2002). Progressively as the market expanded and matured, different types of investment vehicles started to emerge. Many individual corporations in particular entered the VC market with internal funds managed by hired fund managers on their behalf to invest in ventures of strategic importance (Winters & Murfin, 1988; Gompers & Lerner, 2000). These venture capitalists (also known as “captive venture capitalists”) are usually not pursuing fund raising and their strategic venture investment is viewed by many corporations as a substitute for internal research and development activities (Ernst et al., 2005).

The VC literature gives a separate attention to corporate venture capital and entrepreneurship. Hellmann (2002) classified the VCFs as strategic and independent VC investors. The strategic VCs look to create synergies between the ventures and their core business. Hellmann (2002) considers corporate VC funds investing strategically in line with the sponsors’ core businesses as an example of strategic VCs. By contrast, he argues that independent VCs who raise and invest funds independently are motivated by the return on investment rather than any specific strategic outcome. These two types of VCs are in a position to organize and manage funds and portfolios using different strategies (Sykes & Block, 1989).

Beside corporations, governments in many countries directly invest in VC funds to promote technological innovation and entrepreneurship (Keuschnigg & Nielsen, 2001; Cumming, 2007). In Australia government funding programs and initiatives have also been supported by complimentary policy and regulatory reforms (Lerner & Watson, 2008). Public university endowment funds started to invest in VC usually to promote internal research and development outcomes (Wright, Lockett, Clarysse, & Binks, 2006). Banks and other financial intermediaries which do not usually lend to early stage enterprises as a part of their core business also started to form separate companies to invest in venture capital (Hellmann, Lindsey, & Puri, 2008). Institutional investors such as governments, universities, banks come up with different investment objectives and strategies as well as different structures of investment vehicles.

There is limited interest in VCFs’ classification. Florida and Kenney (1988) identified three types of regional VC complexes in USA, namely the Silicon Valley’s technology oriented complex, New York’s finance-oriented complex and Boston’s hybrid complex. The study by Elango et al. (1995) describes four potential differences between VCFs, namely geographical location, firm size, stage preference and amount of assistance provided to the portfolio companies. The academic literature on VC either leaves other VC investment vehicles out of its analytical boundary or treats corporate VCs separately (Gompers & Lerner, 2000). Guo and Jiang (2013) distinguish between local and foreign VCFs in China using organizational form with local firms organized as a limited liability partnership (LLP) and foreign ones as a limited liability company (LLC). Croce et al. (2015) distinguish between independent and bank affiliated VCFs and analyse their exposure to post investment leverage.

However, in the market all investment vehicles are competing for the same set of entrepreneurial ventures. Therefore, it is worth understanding the behaviour of different VCFs as well as how they compete and collaborate with one another. Subsequently, all these types of investment vehicles should be taken into account and categorized in terms of their specialization. Thus, the classification we put forward would be significantly

different from the ones proposed by other authors such as Florida and Kenney (1988), Elgango et al. (1995), Hellmann (2002), Guo and Jiang (2013), Croce et al. (2015). We argue that every type of VCFs ultimately pursues financial return while each might take different strategies. The strategic VCFs for example may prioritize final returns. Similarly, the size, geographical location, stage and industry focus of any venture investor could reveal the nature of VCF's specialization.

We classify all investment vehicles in three categories according to specialization in terms of firm resources using resource based theories. They argue that firms' competitive advantage which could influence strategies is based on the tangible and intangible resources they possess (Wernerfelt, 1984; Peteraf, 1993). Some of the firm resources may be unique and difficult to imitate giving ongoing competitive advantage (Grant 1991; Barney, 2001). Being a non-resource intensive service industry, we suppose that VCFs have two vital resources – funds (financial) and expertise (nonfinancial). The resource combination gives them competitive advantages which in turn influence their investment strategies. According to the venture capital literature, VCFs can syndicate investments to access the unique resources of other firms (Bygrave, 1987; Lockett and Wright, 2001; Tykvova, 2007). However, there has not yet been an empirical analysis of the VCFs' specialization in order to categorize their nature and activities. A specialization based classification of VCFs would allow us to investigate whether this influences firm behaviour not only in portfolio choice but also in partner selection for investment syndication.

### **3. Venture Capital Firm Classification**

Venture capital firms (VCFs) require funds which are provided by the investors and offer expertise for managing the funds. The expertise could be specific to a particular industry and/or location (Gupta & Sapienza, 1992). Thus we argue that all VCFs possess financial and nonfinancial resources in some combination which defines the nature of their specialization. We classify the firms in three categories, namely: Strategic, Independent and Financial VCFs. Unlike Hellman's (2002) classification, strategic VCFs beside corporate VCFs include other similar special purpose firms. Similar to Hellmann's (2002) classification we identify independent VCFs as those which raise funds. Financial VCFs are those sponsored by financial institutions such as banks and superannuation funds. From the Australian dataset the VCFs are identified on the basis of their organizational structure and financial affiliation taking into account that they are organized to maximize the access to resources (Pichler & Wilhelm, 2001; Berger et al., 2005).

#### *3.1 Strategic VCFs*

This category would include corporate sponsored VCFs as well as other special purpose VCFs such as public VC funds, university endowment funds investing in start-up and business incubator programs. They are usually not involved in fund raising activities. Funds are provided by the sponsor institutions. Hence, they are also known as captive VCFs. The purpose of investment could be limited in the sense that it would be strategically driven by the sponsoring organizations (Hellmann, 2002; Gompers & Lerner, 2000). However these VCFs usually have specialized knowledge and relevant industry experience. Furthermore, their organizational resources and market accessibility could contribute to the value enhancement of the ventures at the point of exit. Their funds are usually not large and venture financing may be limited by the investing organization. Concurrently, the specialization would allow risks related to investment in start-ups which require more expert attention from the VCs (Sapienza, 1992). The strategic VCFs have competitive advantage in identifying investment opportunities quickly at an earlier stage before any competitors. Taking up a good quality venture earlier than the competitors has another advantage as the equity pricing would usually be lower at that stage requiring less investment funds. Thus, such VCFs tend to have relatively smaller funds under their management and they would specialize in nonfinancial resources such as expertise.

#### *3.2 Financial VCFs*

This category is similar to the strategic VCFs in the sense that they are not involved in fund raising. They are primarily affiliated with financial institutes which provide the funds. Although, the core business of banks and many non-bank financial institutes does not allow them to invest in high risk entrepreneurial ventures, they tend to form separate VCFs to invest in risky assets. Financial VCFs pursue pure financial return rather than any narrow strategic objective as the core business of the sponsoring institutions is maximizing financial return. Meanwhile, these VCFs tend to have relatively less venture specific experience. They usually fall short of industry specialization with little competitive advantage in early stages ventures. On the other hand, as affiliates of financial institutes the fund size they manage is usually large. Financial VCFs would hire professional fund managers often with financial market expertise and with strong capital market networks useful for ventures' exit. Hence, they have competitive advantage in later stage venture investments with lower risk exposure. The investment horizon of financial institute affiliated VCFs is usually shorter which would be consistent with

investment in later stage ventures. Nevertheless, financial VCFs could also hire managers with industry expertise and compete with independent VCFs in start-up investment market. In Australia from their early years, VCFs affiliated with banks have played a dominant role in terms of market capitalization.

### 3.3 Independent VCFs

This category represents the VCFs which raise funds and manage the portfolio independently. They could invest either in early and expansion stage ventures. The management team could specialize in one or more industries and/or geographic locations. They raise funds from a set of retail or institutional investors with similar risk profiles and investment focus. The portfolio construction would be consistent with the management expertise they possess. The expertise and experience of the VCs could be instrumental in identifying opportunities before the competitors and adding value to the portfolio. The fund size and investment horizon should be in line with the investment objectives. Hence, independent venture capitalists have financial and nonfinancial resources in a relatively balanced proportion. Like strategic VCFs they could have venture specific expertise to seize opportunities in early stage ventures and like financial VCFs they could have flexibility to raise larger funds and invest in expansion stages.

## 4. Theories and Hypotheses

We defined the VCFs' specialization and competitive advantage in terms of their financial and nonfinancial resources in line with the resource based theories of firms (Wernerfelt, 1984; Peteraf, 1993; Barney, 2001). In the VC industry the critical firm resources are financial and nonfinancial which together influence the stage or industry specific portfolio construction (Gupta & Sapienza, 1992). Managerial attributes and the market network of the fund managers could be a source of diverse investment strategies adopted by different VCFs (Gort et al., 1985). Therefore, VCFs choose investment strategies to take advantage of the firms' tangible and intangible resources. Their risk profile and specializations could be reflected in the organizational structure, corporate affiliation as well as in portfolio construction (Guo & Jiang, 2013; Berger et al., 2005; Norton & Tenenbaum, 1993). Hence, for empirical purposes we use the organizational affiliation and portfolio characteristics of the VCFs to identify specialization and related strategies.

In the early stage the ventures might require more attention and nonfinancial resources from the venture capitalists (Sapienza, 1992). Strategic VCFs are likely to have industry specific expertise and advantage in identifying investment opportunities in the early stage. Early stage private equities are relatively cheaper as the investment risk is higher. Hence, the VCFs investing predominantly in early stages in any industries would manage relatively smaller funds. The stage focus may sometimes be explicitly revealed in firms' portfolio whereas many VCFs declare their investment focus. We expect that strategic VCFs would focus primarily on early stage ventures. On the other hand, VCFs affiliated with financial institutes are likely to have greater access to funds from the sponsors. Since the objective of the financial institutes is maximizing returns on investment, the affiliated VCFs would entirely focus on pure financial return, rather than any narrow strategic objective. Lack of specialization could limit their ability of screening ventures at the early stage. Compared to seed stage, expansion stage investments come with a lower risk, although with a higher equity price. Such options could be suitable for these VCFs given their greater access to funds, shorter investment horizon and limited venture specific expertise. Thus, we predict that they would focus more on expansion stage rather than early stage ventures. The first two hypotheses to be empirically tested are:

H1: Investors in seed/ early stage ventures are likely to be the strategic VCFs.

H2: Investors in expansion stage ventures are likely to be the financial VCFs.

In terms of investment screening and management, an individual VCF could require complementary resources from other firms which could lead to co-investment or syndication. Pfeffer and Salancik (2003) argue that organizations are limited by their resources and therefore subject to interdependence. Das and Teng (2003) used the resource based view to explain strategic alliances between firms. In essence sharing information and getting access to the specialized knowledge of other VCFs are seen as the key driver in syndication (Bygrave, 1987; Manigart et al., 2006). We expect that strategic VCFs because of their greater venture specific expertise and limited funds could seek collaboration with independent or financial VCFs. Consequently, a strategic VCF is more unlikely to co-invest with another strategic VCF. Financial VCFs on the other hand are less likely to invite similar VCFs to syndicate as they are likely to seek industry specific expertise in the potential partners. Nonetheless, it should be distinguished from later stage private equity investments where financial VCFs could be active in both equity and debt syndication. The second two hypotheses to be empirically tested are:

H3: Strategic VCFs are more unlikely to invite a similar VCF to syndicate.

H4: Financial VCFs are more unlikely to invite a similar VCF to syndicate.

## 5. Empirical Analysis

To empirically test the above four hypotheses, we analyse venture capital investments in Australian companies by Australian VCs between 1984 and 2008. This covers the first 25 years of the life of the Australian VC industry. More specifically the observation includes 1157 investment rounds in 364 companies financed by 126 VCFs. Investments in early stage and expanding technology related companies have been considered as VC investment. The information for the empirical investigation has been extracted from the *VentureXpert* database (Venture Economics, 2009) which is fairly comprehensive and widely used by academics and practitioners (Gompers & Lerner, 2004). The dataset provides a venture industry classification and information about the VCF profile including investor affiliation which is useful for our purpose. Corporate affiliate VCFs, incubators, university and government venture funds are classified as strategic VCFs while VCFs directly affiliated with banks and nonbank financial institute are classified as financial VCFs. Within the dataset the independent VCFs are defined as those raising and investing own funds. Table 1 presents the classification and characteristics of the VCFs in the sample.

Table 1. Classification of VCFs

Category	Examples	Funds	Investment	Other characteristics	Number in sample
Financial	Bank group, affiliate/subsidiary of financial institution, insurance firm affiliate/subsidiary, investment/merchant bank investing own/client funds, commercial bank affiliate/subsidiary, investment management firm/finance consultancy, investment/ angel network, private equity advisor/ fund of fund manager	<ul style="list-style-type: none"> <li>• Provided by the financial organization</li> <li>• Large</li> </ul>	<ul style="list-style-type: none"> <li>• Pursue pure financial return</li> <li>• No competitive advantage in early stage investment</li> <li>• Competitive advantage in later stage investments</li> </ul>	<ul style="list-style-type: none"> <li>• Not involved in fund raising</li> <li>• Less specific experience, unless additional personnel hired</li> <li>• Shorter investment horizon</li> </ul>	46
Independent	Private equity firms investing own capital	<ul style="list-style-type: none"> <li>• Raise funds</li> <li>• Flexibility to manage larger funds</li> </ul>	<ul style="list-style-type: none"> <li>• Independent portfolio management</li> <li>• May have advantage in identifying opportunities and invest in expansion stage</li> </ul>	<ul style="list-style-type: none"> <li>• Industry and/or geographic specialization possible</li> </ul>	59
Strategic	Government programs, university affiliated programs, incubators, corporate subsidiary/affiliate, corporate venture program, business development fund	<ul style="list-style-type: none"> <li>• Provided by sponsor institution</li> <li>• Usually smaller</li> </ul>	<ul style="list-style-type: none"> <li>• Strategically driven</li> <li>• Competitive advantage in identifying opportunities</li> </ul>	<ul style="list-style-type: none"> <li>• Not involved in fund raising</li> <li>• Specialized knowledge and relevant industry experience</li> </ul>	21
					126

### 5.1 Descriptive Statistics

The Australian VC industry represents particular features in relation to different types VCFs (see Table 2). Independent VCFs raising and investing own funds are the most active category in terms of investment activity; 66.3% of the total ventures in the dataset received investment at least from one independent VCF. Financial VCFs are the second most active category which have invested in 45% companies. In terms of total share in investment activities strategic VCFs have been narrowly and selectively active in line with their strategic focus and nonfinancial specialization.

Table 2. Different VCFs' preference over venture stage

Type of VCFs	Seed & Early Stage		Expansion Stage		Total Ventures	
Financial	31	33.70%	61	66.30%	92	25.27%
Independent	102	52.31%	93	47.69%	195	53.57%
Strategic	65	84.42%	12	15.58%	77	21.16%
All	198	54.40%	166	45.60%	364	100%

Table 3 shows the size distribution of different VCFs in terms of capital under management. We observe that financial VCFs manage the largest funds followed by independent VCFs which is consistent with our expectations. It can also be observed that the strategic investors manage relatively small funds. Their expertise and specialization arguably compensate for the fund size. Interestingly, the minimum fund size for all types is similar which could be considered to be the critical fund size.

Table 3. Different VCFs' size distribution

Type of VCFs	Maximum (US\$ million)	Minimum (US\$ million)	Mean Size (SD)
Financial	1952.9	0.5	341.8 (567.1)
Independent	476.6	0.6	121.3 (116.2)
Strategic	151.8	0.6	23.1 (39.2)

In terms of portfolio companies, we follow the industry classification of the dataset and we have considered two broad classes of technology related industries. They are: BMH (biotechnology, medical and health) industry and ICT (information and telecommunication technology) industry. Other ventures not related to technology have been excluded from the analytical boundary as VC traditionally and for most users refers to investment in innovative and technology related ventures especially in the early and expansion stage (Chesbrough, 2002). The data along with industry classification also provide information on investment date, amount and venture stage which allows us to identify and record the syndication activities of VCFs.

Table 4. Industry preference of different VCFs

Industry	Financial	Independent	Strategic
BMH (N=123)	39.13%	28.72%	40.26%
ICT (N=241)	60.87%	71.28%	59.74%

The VCFs have invested strongly in the ICT sector (241 ventures compared to 123 in BMH, see Table 4). There are however significant numbers of VCFs which invest in both ICT and BMH sectors. Further, all types of VCFs are involved in syndication as shown in Table 5. The strategic VCFs are the least active in seeking co-investors. It can be explained by the fact that they invest more often in early stages given their expertise and as the ventures mature obtaining debt could become easier and preferable. The financial VCFs demonstrate higher degree of syndication which could be explained by the nature of specialization as well as risk diversification strategies. Despite this, there is only a small difference between them and independent VCFs.

Table 5. Degree of syndication by different VCFs

Type of VCFs	Propensity to Syndicate (%)
Financial (N=92)	23.91
Independent (N=195)	23.59
Strategic (N=77)	19.48

## 5.2 Regression Model

We use the investment and co-investment/ syndications activities of each VCF type observed in the dataset for testing the hypotheses. Simple discrete (binary) choice econometric models are used without losing the insight

and generality of the predictions. Cameron and Trivedi (2005) suggest that empirically there is insignificant difference between the predicted probabilities generated by *probit* and *logit* models. We apply *probit* models for the empirical investigation of each of the four hypotheses with model 1 and 2 corresponding to hypothesis 1 and 2 and model 3 and 4 to hypothesis 3 and 4.

#### 5.2.1 Model 1 and 2

Model 1 and 2 have been structured as *probit* models in order to validate hypothesis 1 and 2. The 'Type of VCFs' is considered as the dependent variable. In both models, the stage of investee companies is considered as the independent variable representing the risk profile of the investors. Investments in start-up and early stage ventures are likely to be made by the strategic investors. In other words, the probability that a VCF is strategic would be higher if an investment round occurs at the seed/start-up and early stage. More specifically, in models 1, the dependent variable 'Type of VCF (Strategic)' is binary. Its value is considered 1, if one or more investors are strategic VCFs and 0 if not. Similarly, we consider 'Company stage' as 1 if the first VC investment round is made in early stages (seed/start-up) and 0 if not. The coefficient is expected to be positive. The control variable is 'Type of industry' which is also binary. It is equal to 1 for BMH industry and 0 for ICT industry. Model 2 has the same structure as model 1. 'Type of VCF (Financial)' is the dependent variable. It is considered 1 when one or more investors are financial VCFs in the first VC investment round and 0 if not. Then, we consider 'Company stage' as 1 if the first VC investment round occurs during the expansion stage and 0 if not. The coefficient is expected to be positive. Again, the control variable is 'Type of industry' which is also binary. It is equal to 1 for BMH and 0 for ICT.

#### 5.2.2 Model 3 and 4

Model 3 and 4 are also structured as *probit* models in order to validate hypothesis 3 and 4. The motivation of a certain VCF to invite another VCF to co-invest in a venture on the basis of their resource and specialization is being investigated here. We link the types of lead and follower VCFs using the dates of the investment rounds from the dataset. The *probit* model is constructed accordingly. The type of invited VCF (follower) in the syndicate is the independent variable whereas the type of inviting VCF (initiator) is the main dependent variable. It has been argued that the type of follower VCF in the syndicate is determined by the type of the lead VCF. However, in some cases there may be more than one lead and follower co-investors. In model 3, more specifically we consider the 'Type of follower VCFs (strategic)' as the dependent variable which is 1 when the VCF is strategic and 0 if not. Then, we consider the 'Types of initiator VCF (strategic)' as the independent variable which is essentially a lagged endogenous variable and thereby can be treated as exogenous. It implies that the type of initiator VCF is predetermined which will determine the types of follower VCF subsequently. The coefficient is expected to be negative. In other words, it is more unlikely for a strategic VCF to invite a similar investor to syndicate. In model 4, similarly we consider the 'Type of follower VCFs (financial)' as the dependent variable which is 1 when the VCF is financial and 0 if not. Thereafter, we consider the 'Types of initiator VCF (financial)' as the independent variable. The coefficient is again expected to be negative. In both models, 'Type of industry' has been used as the control variable which is equal to 1 for BMH and 0 for ICT and it is not expected to have an impact on the selection of syndication partners.

### 5.3 Regression Output

The first two hypotheses relate the firms' specialized resources with venture stage preference in investment decisions which have several implications. Early stage ventures come with higher risk but lower equity prices. Hence, venture capitalists with nonfinancial resource such as expertise and industry specific knowledge can explain the competitive advantage in identifying opportunities at the early stage. The risk appetites of the VCFs rather than financial position tend to be more important. The results from Model 1 (see Table 6) validate our prediction that strategic VCFs have higher likelihood of investing in companies during the early development stage. Similarly, the results from Model 2 (see Table 6) also validate our prediction that financial VCFs have higher likelihood of investing in companies during expansion. Financial VCFs as per our classification have affiliation with financial institutes and hence a strong financial position. These firms have lower risk appetite and a shorter investment horizon. They have competitive advantage in buying equities at a later stage when equity prices are higher but risk is lower. The investment patterns are similar in both ICT and BMH industries for the two categories of VCFs.

Table 6. *Probit* model of venture stage selection by different VCFs

Model 1. Dependent variable: Type of VCF (Strategic)		
	Coefficient	Z-Value
Constant	-1.2936	-10.74
Company stage (Start-up/ Seed)	1.1298	7.01***
Type of industry	0.0168	0.10
Model 2. Dependent variable: Type of VCF (Financial)		
	Coefficient	Z-Value
Constant	-1.1482	-8.82
Company stage (Expansion)	0.7235	4.82***
Type of industry	0.3157	2.03

\*Significant at 10%, \*\*Significant at 5% and \*\*\*Significant at 1%, Log likelihood Ratio for Model 1 is 53.10\*\*\* and for Model 2 is 25.51\*\*\*; Number of observations: 364.

The specific specialized resources of the VCFs not only can explain behaviour in relation to venture stage selection, but also in relation to co-investment partner selection. Co-investment is common in the VC industry which has implications in terms of financial and nonfinancial resource alignment as well as risk reduction and diversification. Given our categorization of VCFs, we expect that they would seek co-investors for complementary resources with impact on risk and return. Strategic VCFs are therefore less likely to co-invest with a similar VCF as they might have similar and competing instead of complementary resources. They usually specialize in identifying early investment opportunities. Hence, they are likely to co-invest with independent and/or financial VCFs. The results from Model 3 (see Table 7) suggest that strategic VCFs are more unlikely to syndicate with similar investors to avoid duplication of resources and internal conflicts. The results from Model 4 (see Table 7) similarly validate that financial VCFs are less likely to syndicate with similar investors.

Table 7. *Probit* model of co-investor selection by different VCFs

Model 3. Dependent variable: Type of Follower VCF (Strategic)		
	Coefficient	Z-Value
Constant	-0.8710	-2.41
Type of lead VCF (strategic)	-1.2480	-2.16**
Industry	0.8312	1.91
Model 4. Dependent variable: Type of Follower VCF (Financial)		
	Coefficient	Z-Value
Constant	-1.5345	-3.15
Type of lead VCF (financial)	-0.7982	-1.72*
Industry	1.4729	2.62

\*Significant at 10%\*\* and Significant at 5%; Log likelihood Ratio for Model 3 is 9.15\*\*\* and for Model 4 is 10.21\*\*\*; Number of observations: 52.

Combining the regression results and data provides further insights. Strategic VCFs tend to syndicate less which could be explained by their strategic focus as well as industry expertise. While syndicating they tend to invite independent VCFs indicating further need for both financial and nonfinancial resources. The independent VCFs on the contrary tend to invite similar VCFs to co-invest indicating the need for combining resources necessary for venture screening, monitoring and development. Financial VCFs tend to invite independent VCFs as the latter could provide expertise needed for venture monitoring and growth. They could even invite similar VCFs for risk diversification at later stage investments. The empirical analysis shows a distinctively different behaviour by the three categories of VCFs which justifies the proposed new classification. It is also interesting to note that these specific features cut across the two very distinctive industry groups which confirms that the behaviour is related to the nature of the venture industry.

## 6. Discussion

Specialization based investment strategies have several sustainability implications which we analyse here as in the post-GFC financial world industry practitioners and policy makers have been seeking understanding and



instruments for enhancing the sustainability of the financial system with increasing focus on the risk and opportunities related to the environment, social and governance (ESG) matters (UNPRI, 2014; PwC & Waterman, 2014; Nemetz, 2015). The literature on corporate sustainability has emphasized the growing role of ESG risks involved in investment decisions which has resulted in subsequent growth in sustainability accounting frameworks in recent years (Brown et al., 2009). However, such formal accounting has often been subject to the so-called greenwash and misapplication (Laufer, 2003; Furlow, 2010). Therefore, we suggest that existing good industry practices and culture such as specialization driven investment and co-investment practices can be the basis for integrating other emerging sustainability practices which could eventually influence firm behaviour (Gordon, 1991).

Specialization based investment of the VCFs can be instrumental in optimizing the limited financial and nonfinancial resources in the Australian market by producing an efficient mix of resources at the firms' portfolio level and by mobilizing its potential. This is especially important for the Australian VC market which has a shortage of long term risk capital necessary for start-up enterprises as well as VCs with relevant expertise and investment focus on technology start-up companies (AVCAL, 2012). Interdependence of the VCFs for resource exchange which drives syndication allows the VCFs to pool expertise and experience in venture selection and investment risk reduction as well as portfolio risk diversification (Hopp & Rieder, 2011; Hoppe & Lukas, 2014). Repeat co-investment and collaboration among the firms can take the VCs beyond arm-length transactions to a network of relationships which could help VCs accumulate social capital and build reputation (Kilduff & Brass, 2010; Casamatta & Haritchabalet, 2007). Gu and Lu (2014) consider reputation as an intangible organizational asset for VCFs which is represented by past performances. Reputed VCs are valuable and in demand for their expertise (Lerner, 1994, Tykvova, 2007; Gu & Lu, 2014). Social integration of the VCFs could help developing the industry culture which could influence firms' behaviour and performance (Christensen & Gordon, 1999). It is not surprising that firm resources and inter-firm networks facilitating resource exchanges are attracting increasing attention with implications on innovation, entrepreneurship and marketing (Baraldi et al., 2012).

From what we have observed in the Australian VC market, VCFs do not exhibit distinctively different behaviour in relation to two significantly diverse industries – ICT and BMH. It is unlikely that the VC industry will respond differently to any environmental or generally sustainability priorities, such as related to climate change, water resources or nature preservation. Sustainability imperatives are unlikely to be attractive and come into the VC mix if left to the market. The VC industry's main priority is its financial viability. Although VCs are increasingly giving attention to ESG issues in response to growing pressure from government and other stakeholder (PwC & Waterman, 2014; UNPRI, 2014), a culture based industry governance is needed to complement and strengthen the compliance based corporate governance. The industry culture could support standardization of good practices, such as responsible investment and ESG risk management among the firms.

## 7. Conclusion

The VC industry in Australia in the last three decades has attracted a large variety of individual and institutional investors resulting in different types of investment vehicles. However, the literature related to venture capital has often overlooked the diversity of investment vehicles and their role in the development of this industry. Using the resource based view of firms meeting the demand for entrepreneurial capital in Australia for ventures at different stages of development, the paper captured this diversity and demonstrates how three distinctive types of VCFs represent diverse clusters of investors and venture capitalists. The developed specialization based classification of VCFs, namely strategic, financial and independent, allows better understanding of the firms' behaviour and market representation. According to the analysed empirical investigation, different kinds of investors with different risk profiles and investment preferences participated in the Australian VC market. They consequently used different investment vehicles to participate in the market and played specific and complementary roles in the development of the various market segments in its first 25 years of operation.

Strategic VCFs brought in the expertise relevant for the ventures in the early stages and financial VCFs contributed further funding for expanding the ventures. This is clearly reflected in the firms' investment strategies and portfolio section. The independent VCFs played a vital role in market development as they raised funds from various groups of investors and invested across the stages and industries. In addition, these mainstream VCFs gathered expertise and experience. Hence, the strategic and financial VCFs often invited independent VCFs to co-invest in ventures whereas the strategic and financial VCFs were less likely to invite similar counterparts to syndicate. This reflects the significance of complementary resources for the growth of portfolio companies. The paper not only demonstrates the interdependence of VCFs through co-investment activities but also highlights the lack of specific industry interest which potentially has implication for sustainability and environmental technologies that reduce carbon emission, decouple growth from the use of

energy and materials, to mention a few examples. The empirical analysis shows that VCFs are less responsive to industry differences. Any industry preference is primarily driven by market and financial returns where ICT and BMH sectors have largely been attracting venture capital, while sustainable technology ventures and social enterprises remain at the margin. Further studies are needed to explore how the VC industry could be integrated in a tangible social platform that could be used in encouraging and standardizing good industry practices with sustainability values.

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