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**Paradise Lost? The case of Technology-based Small Firms in New Zealand in the post  
Global Financial Crisis economic environment**

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## Abstract

In this paper we draw on two studies that used face to face, qualitative interviews with technology-based small firms (TBSFs) and informal interviews with key informants. The interviews took place with two data sets of TBSFs, the first with 20 firms in 2011 and the second with 34 agri-business TBSFs in 2013. This allows some temporal comparisons of the funding environment for TBSFs in New Zealand, but this was not a longitudinal study as the two data sets were composed from the recruitment of different firms. However, all the TBSFs were located in New Zealand, a small open economy with a limited domestic market, a population of 4.4 million, GDP per capita of US\$32,260 (2010) and arguably an immature and limited financial infrastructure. This environment is compounded for founding technology-based entrepreneurs, since to develop and stay in New Zealand means accepting being a long distance from major overseas markets, when in theory at least TBSFs have potential to be in global markets. Such TBSFs, therefore, face pressure to move overseas for markets and for finance and other resources; if successful they may make attractive takeover targets for overseas investors and MNCs. Despite these challenges, TBSFs have been promoted as key contributors to GDP and a way of closing New Zealand's productivity gap (compared with Australia and other developed nations). Although we find evidence of the development of embryonic regional and specialised business angel networks (BANs) on the supply-side of finance, there is still a marked reluctance to undertake a search for external equity and evidence of discouraged borrowing and discouraged grant-based applications on the demand-side. New Zealand is sometimes described as "paradise"<sup>1</sup> due to its natural and outstanding beauty, but in our conclusions we suggest that the comparatively stable economic environment has not operated in favour of TBSFs.

## Introduction

A number of official reports have investigated what appears to be a symptomatic failure in New Zealand: to develop, fund and retain the development of R&D intensive, high value, technology-based small firms (TBSFs). This under-development has often been seen as one of the factors behind New Zealand's relatively low rate of productivity per capita by international comparisons, for example, being some 25% lower than that of Australia (Mai, et al. 2010)<sup>2</sup>. A report on high value manufacturing for the former Ministry of Science and Innovation (MSI, 2011a, page 19) commented that:

*"The New Zealand high value manufacturing and services sector is under-developed, and could contribute substantially more to the economy than it currently does, particularly through growth in high productivity advanced technology industries."*

It could be argued that a small, open economy like New Zealand, remote from major world markets, will not have the resources and infrastructure capable of supporting TBSFs through to maturity. A population of 4.4 million is coupled with being a long distance from

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<sup>1</sup> The use of this term often refers to a fondness for the high quality of life in New Zealand and its economic environment, not just the natural beauty of the country.

<sup>2</sup> New Zealand had a GDP per capita of US\$32,260 in 2010, compared to a GDP per capita for Australia of US\$50.746 in 2010 (World Bank, 2012)

major overseas markets. New Zealand has proportionately a high business population per capita with over 457,000 registered businesses (MED, 2009)<sup>3</sup>. However, with 98 percent of firms employing fewer than 50 employees, 89 percent employing five or fewer and 68 percent having no employees, the proportions of small firms in New Zealand are broadly comparable internationally.

In the World Bank's annual 'Doing Business' surveys, New Zealand ranks second behind only Singapore as one of the easiest nations in which 'to do business', scoring highly on the ease of regulations and on business registration (World Bank, 2014)<sup>4</sup>. Frederick and Monsen (2010) report GEM data that indicate that New Zealand's Early Entrepreneurial Activity rates as one of the highest in the GEM panel data set. However, the benign regulatory environment has created an entrepreneurial paradox. Although New Zealand has a relatively high rate of business formation by international comparisons, it has a relatively low proportion of high growth firms (MED, 2010). Shangqin, et al (2009, page 3) state that the "local ---environment for entrepreneurship---is excellent (yet) innovation remains a problem". The New Zealand Treasury's 2008 report claims that whilst entrepreneurship start-up rates are high, competitive forces are relatively low (partly due to the limited size of the home market)<sup>5</sup>. The OECD review on innovation policy in New Zealand commented that a lack of investment in business R&D was a weakness of the innovation system in New Zealand (OECD, 2007).

As a result of such low levels of business expenditure on R&D (BERD), commercialisation of research has been a specific policy target of the New Zealand Government which announced investment of \$400 million in the establishment of Callaghan Innovation in January 2013. Callaghan Innovation absorbed the former commercialisation agency Industrial Research Limited (IRL), and increased incentives for businesses to undertake R&D (through technology grants) in its budget for 2013-2014. Although BERD has improved in recent years, it still lags behind that of other OECD countries (Statistics New Zealand, 2013).

Agri-business and, more narrowly defined agri-food sectors<sup>6</sup>, are strategically very important for the New Zealand economy. However, there is also much latent potential from improving the value-added and productive potential of these sectors. For example, the low value-added nature of the agri-business industry was highlighted by a report on the sector by Coriolis for the former MED in 2012 and pointed in particular to the potential from increased exports from the food processing sector (Coriolis, 2012). De Backer and Yamano (2012), in

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<sup>3</sup> By comparison, for example, Scotland, with a population of just under 5.2 million, recorded fewer than 291,838 registered businesses in 2009 (<http://www.scotland.gov.uk>) (0.11 per head of the population in New Zealand compared to 0.06 in Scotland).

<sup>4</sup> As an economy in which to start a business, New Zealand does even better being ranked as the easiest nation in which to start a new business (World Bank, 2013)

<sup>5</sup> This is supported by the World Economic Forum's Global Competitiveness Index (Schwab, 2009) which indicates that New Zealand has improved to 20th place overall for 2009, but still performs lower on business sophistication and innovation (36th).

<sup>6</sup> The agri-food sector is defined by the inclusion of all businesses involved in the food supply chain. However, for the purposes of this paper, we use agri-business to define the sector more broadly which includes food, fibre, forestry and related areas of production.

an OECD paper that examined the participation of OECD nations in global value chains (GVCs), indicated that economies with high trade/GDP ratios have greater participation in GVCs. New Zealand's ratio at 30% was ranked 29<sup>th</sup> out of 36 OECD countries. Achieving the ambitious targets set out by the New Zealand Government's Business Growth Agenda (MBIE, 2012), will depend on the role of TBSFs in increasing productivity and value-added.

Theoretically, the role of finance is a crucial factor that can determine whether there is successful development for TBSFs and their technology-based entrepreneurs. TBSFs, by their nature, are perceived as more risky than other small firms by potential funders and may not have the collateral required by banks to fund long term projects (Bank of England, 2001). The technology-based entrepreneur is likely to exhaust personal financial resources during R&D and early stage development and will need to rely upon staged external investor funding (Oakey, 2003). Access to such sources of external and patient capital are often problematic and difficult to source, even assuming that a match can be made between the aspirations of the technology-based entrepreneur and those of the individual or corporate investor (Mason and Harrison, 2004). Classic venture capital is provided in a number of staged deals with planned exits through an IPO or trade sale (Mason and Harrison, 2004). Such funding 'escalators' may only exist where there are sufficient networks of individual and corporate investors. Well known examples include Silicon Valley, Massachusetts (USA) and Cambridge (UK). With such examples relatively rare, the lack of adequate funding sources for TBSFs can be viewed as market failure leading to state intervention either through direct grant schemes or through attempts to stimulate the market through co-investment schemes.

### **The environment for entrepreneurial finance in New Zealand**

The importance of context for understanding entrepreneurial behaviour has been identified by a number of researchers who point to the importance of embeddedness, networks and contacts for entrepreneurship behaviour and consequential economic development (Zahra, 2007; McKeever, et al 2014). Likewise the environmental context is important for understanding entrepreneurial finance, both the demand side behaviour of entrepreneurs seeking external finance and the supply side behaviour of individual investors and other actors such as financial institutions. Hence, to place our discussion in context, it is necessary to comment on New Zealand's financial environment.

For debt capital, New Zealand's environment has been remarkably stable throughout the post Global Financial Crisis (GFC) period. New Zealand's main commercial banks are owned by Australian financial institutions<sup>7</sup> which did not have any of the spectacular financial collapses that characterised the financial institutions in the UK, Europe and North America during 2008-2009. Consequently, neither state intervention nor bail-out schemes have been needed. Unlike their North American and European counterparts, they are very profitable and secure since they did not engage in some of the sub-prime activity that contributed to the post GFC bail outs in North America and Europe. For example, a recent PwC report commented

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<sup>7</sup> Like Western economies a small number of commercial banks dominate the financial credit markets, the 'big four' being ANZ, ASB, BNZ, and Westpac, (in 2013 the National bank was taken over by ANZ, further increasing the degree of concentration).

that the main five commercial banks in New Zealand are all listed in the World's 50 safest banks in the Global Finance Magazine's list for 2012 (PwC, 2013).

In theory this should mean that New Zealand's TBSFs have been faced with secure commercial banking institutions which should provide some confidence in their stability. Some conclusions are drawn at the end of the paper in the light of this stable and secure banking system. It is worth noting as well that New Zealand does not have a state guarantee loan scheme which in theory means that the commercial banks can require 100% security for any loans to TBSFs.

For sources of external equity, as might be expected for a small economy, New Zealand has historically had limited sources of both venture capital (VC) and business angel investment, although there are signs of improvement. The start-up venture capital market was stated as being in a fledging state in 2011 by a New Zealand Venture Investment Fund report (NVIF, 2011, page 4): "The early stage company investment market in New Zealand is still in a fledgling state but has made significant progress in the last 10 years". New Zealand does not have a tradition of equity investments by high net worth individuals (HNWIs) and according to a previous Governor of the Reserve Bank, New Zealanders have preferred historically to invest in property (Bollard, 2006). This has meant that the size of the informal angel investment market has been relatively small. A report for the former Ministry of Economic Development in 2004 attempted to measure the size of the HNWI market in New Zealand. The report estimated that the market at the time was around \$500m NZD and that the number of individual investors was between 1,000 and 20,000, but only a small proportion, less than 100, could be described as active angels (Infometrics, 2004).

During the post GFC period, private equity markets have seen some developments. For example, a growing interest in business angel activity has led to the creation of the Angel Association for New Zealand that aims to: "increase the quantity, quality and success of angel investments in New Zealand and in doing so create a greater pool of capital for innovative start-up companies" (Angel Association, 2014: <http://www.angelassociation.co.nz/>). Sources of VC funds are represented through the New Zealand Venture Capital Association (NZVCA) which has been longer established, but has also raised its profile and seeks to provide: "a world-best private equity and venture capital environment for the benefit of investors and entrepreneurs in New Zealand" (NZVCA, 2014: <http://www.nzvca.co.nz>)

Despite these recent developments, sources of external equity for TBSFs are acknowledged to be limited and immature, hence the New Zealand Government has intervened directly through the provision of technology funding grants that have gradually been enhanced and extended. For example, the current New Zealand Government has introduced a range of measures, including R&D grants, technology vouchers and tax cuts, targeted at raising business levels of BERD (Key, 2010). At the centre of these recent measures, the technology transfer vouchers have been targeted at technology transfer particularly aimed at trying to improve spin-out commercialisation from New Zealand's Higher Education Institutions (HEIs) and Crown Research Institutes (CRIs). During 2011 and

2012, the threshold levels were reduced making vouchers and grants available for smaller TBSFs, this being coupled with the announcement of the funding, mentioned earlier, for the new Callaghan Innovation. The New Zealand Government has also established additional sources of equity through the New Zealand Venture Investment Fund (NZVIF). NZVIF was established in 2002, with the aim to “help build a vibrant venture capital market in New Zealand” (NZVIF, 2014: (<http://www.nzvif.com>)). NZVIF currently has \$200 million of funds under management, comprising \$160 million in its venture capital fund of funds and \$40 million in a Seed Co-investment Fund (NZVIF, 2014, see later reference and footnote).

Given this background, this paper examines the finance of TBSFs in New Zealand in the post GFC challenging financial environment. In particular, it is concerned with the following two broad research questions:

RQ1: What are the characteristics of the finance of TBSFs in New Zealand?

RQ2: Has the finance of TBSFs in New Zealand changed over recent years?

The remaining sections of this paper cover a review of literature and theory relevant to the role of finance in TBSFs; research methods and data sources; results and analysis from the qualitative interviews, a discussion and implications section before drawing conclusions.

### **Review of Literature and Relevant Theoretical Background**

Relevant literature on the finance of TBSFs can be divided into theoretical concepts and previous research evidence. The classic theory on the finance of TBSFs stems from the economics of information. Applied to SMEs generally, this holds that the existence of asymmetric information between potential funders and SME owners produces credit rationing because information held by SMEs is opaque, for example, held through knowledge of the entrepreneur and not readily available or disclosed. The relationship between SME owners and potential funders is seen as a transactional one (Stiglitz and Weiss, 1981). It is assumed that credit rationing will result, although de Meza (2002) argues that credit is over supplied because over optimistic entrepreneurs exaggerate returns.

For TBSFs at an early stage, like all small firms, information is limited and not always transparent (Schmid, 2001) and assets are often knowledge-based and intangible, being exclusively associated with the founding entrepreneur (Hsu, 2004). In such circumstances, entrepreneurs may be reluctant to provide full information about the opportunity because of concerns that disclosure may make it easier for others to exploit (Shane and Cable, 2002). A more modern development of this theory has moved away from a transaction cost-based to a relationship-based approach (Berger and Udell, 2004) Relationships have, of course, always been more important for venture capitalists and business angels who will make their investment decisions at least as much on management and entrepreneurial abilities as on financial projections and business plans (Feeney, et al. 1999; Mason and Stark, 2004).

When considering TBSFs, a special set of circumstances can be applied:

- Extensive R&D periods for product development. This necessitates raising finance for R&D and the development of prototypes, that is, distinctive requirements for seed capital due to large sunk costs (Geroski, 1995).
- TBSFs will face a period of negative cash flow and losses during the R&D period, this can vary from a few months (say with software providers) to ten years or more (say with bio-technology applications). Entrepreneurs will exhaust private savings/internal sources and need to rely on raising external capital.
- Although patents can be used to protect new products/processes, they are intangible assets and banks may be unwilling to accept them as security.
- Developing cash-flow forecasts for the business plan can be problematic since, with new technology products, markets may not yet exist. Consequently banks are unwilling to lend against forecasts.

Despite the importance of TBSFs for economic development in advanced industrial economies, there has been remarkably little systematic research into the nature of their development. One of the reasons for this is that TBSFs are subject to definitional discrepancies (no standard definition is applied) and, therefore, panel data sets are problematic and expensive to compile. Where studies do exist, they can be difficult to compare because of the difference in sampling techniques which are used. Revest and Sapio (2010) in a review of evidence on financing TBSFs in Europe mention limited studies in the UK, Italy and France. Work has been conducted in the US (Carpenter and Peterson, 2002), but Revest and Sapio (page 7) claim that “the robustness of the results, however, is under question due to a number of methodological limitations”. Revest and Sapio give four main findings: that European TBSFs finance new investments by relying primarily on internal funds, due to asymmetric information; that the European venture capital industry is caught up with that of US and amounts are too large to be viable for TBSFs; that alternative stock markets, such as EASDAQ, have proved unviable and, as a consequence, European governments are actively involved in supporting TBSFs’ needs for finance.

Post GFC it is arguable that TBSFs will be even more financially constrained. One study has been undertaken in the UK post GFC (North, et al. 2013). This study conducted a telephone-based survey with a sample of 100 TBSFs to examine the extent to which their external finance requirements had been met from various sources, since the onset of the financial crash. North, et al. (page 256) concluded that accessing formal external finance had become more difficult, with more than a third of TBSFs reporting that “financial constraints had held back their growth, noticeably the case with spin outs and bio/life science firms which tend to be the most R&D intensive and innovative businesses”.

Mason and Brown’s study with Scottish high growth companies, although not restricted to TBSFs, pointed to the importance of serial entrepreneurship and the prior business experience of technology-based entrepreneurs for successful high growth companies (Mason and Brown, 2013). A similar finding on the importance of prior business experience has been reported by Colombo, et al. with their study of science-based entrepreneurship (Colombo, et al. 2013). Prior business experience brings additional resources through social capital and access to knowledge through networks. Support for the importance of networks is provided by

a Dutch study of innovative SMEs by Keizer, et al. (2002), among their findings were that the more innovative SMEs utilised networks with knowledge centres (to acquire resources). Hopkins, et al. (2013) examined the evolution of biotechnology firms in the UK and US, finding that small biotechnology firms have benefited from deals with large pharmaceutical firms so that the latter get access to (resources) and capabilities. The emergence of an early stage pharmaceutical investment asset class was also found in Cave's (2009) study of patterns of equity investment in UK high tech companies.

Other studies with TBSFs have tended to be very selective and targeted at particular sub-groups such as samples from technology incubators and science parks, partly because of the convenience afforded by such samples. These studies confirm the importance of TBSFs for local economic development (Jones and Parry, 2011) and have rather mixed results for the role of technology incubators (Alsos, et al. 2011). Even selected and specialised studies demonstrate the heterogeneity of TBSFs. For example, Cunha, et al.'s study of academic spin-offs found that even in such closely defined samples a high degree of heterogeneity exists, for example between new companies and other TBSFs (Cunha, et al. 2013).

New Zealand is no exception to the rarity of academic studies on the development of TBSFs. Case study investigations with bio-technology firms have pointed to the increased need for strategic alliances for small biotechnology firms (Ahn, et al. 2011; Davenport, 2005). The increased trend towards agglomeration might suggest that the New Zealand economy is too small and the infrastructure insufficiently developed to support strategic alliances. Davenport (2005), in a study of innovative SMEs in NZ, pointed to the importance of global, rather than local, sources and networks for knowledge acquisition, implying the need for policy recognition of the diversity of knowledge acquisition sources and strategic alliances for TBSFs.

## **Research Method and Data Sources**

For this paper, we combine the data from two qualitative studies with TBSFs. The fieldwork for the first exploratory study was carried out in New Zealand with TBSFs recruited from the nation's two main urban centres: Auckland and Wellington together with a third location at Palmerston North. At the time of this study, in 2011, it was felt that TBSFs located in New Zealand's only other large urban area, Christchurch, will have been affected by the earthquakes of February and June that year which caused widespread disruption to local businesses. The study involved a programme of 20 in-depth, face-to-face qualitative interviews with the founders and chief executives of TBSFs drawn from different technology-based sectors (table 1), although the majority were concerned with IT or digital technology. A further seven interviews were conducted with key informants (including investors, incubator managers, and economic development agency managers) drawn from the three locations.

The second data set is drawn from a more narrowly-defined study which focused on TBSFs in the agri-business sector. This second study was designed by the authors to build on the first study, but to focus on an identified and strategic sub-sector for the New Zealand economy, although unlike the first study, access to finance was only part of the focus of the interviews which more broadly investigated the role of innovation (Deakins and Bensemman,

2013). The narrowness of our sector focus meant that companies could not easily be recruited or identified. For recruitment of participating companies we relied on existing contacts at the New Zealand Centre for SME Research and expanding the search for suitable respondent companies with assistance and recommendations from key informants with economic development agencies and their equivalent bodies such as local authorities. This study included TBSFs located in Christchurch and the Canterbury region, along with other regions, and was undertaken in 2013. A programme of 34 in-depth, face to face interviews was undertaken (table 2) and a further nine key informants were consulted.

The interviews with respondents were conducted using an open-ended interview guide which was used to investigate the role of finance in the context of issues and challenges faced by the respondents. Interviews were coded against themes drawn from the literature. However, it was important for the interviews to be sufficiently open-ended to allow for the exploration of additional themes from the data. The research approach allowed for significant patterns to emerge as they cut across heterogeneous cases (Patton 2002). Analysis was undertaken with QSR Nvivo qualitative data analysis software. Themes from the literature were used to identify major ‘nodes’ in the software, but the analysis was undertaken carefully to allow the data to generate additional ‘nodes’. This allowed for specific cases and for the data to be used inductively, not merely deductively and allowed themes to emerge such as the importance of bootstrapping.

Low risk ethical approval was obtained from Massey University’s Research Ethics Committee for both studies and respondents were offered the opportunity to review the transcripts and make subsequent changes before analysis of anonymised transcripts was undertaken.

It should be noted that tables 1 and 2 hide considerable diversity. For example, in study 1, of the early stage firms, three had completed a period of R&D and were about to embark on an expansion stage if sufficient funding and resources could be secured. Although a number of firms could be described as mature, in a small number of cases this comprised a period of non-technological development as they were still engaged in R&D for new products<sup>8</sup>.

**[Take in Table 1: Study 1: Technology-Based Small Firms Profile Data, 2011]**

**[Take in Table 2: Study 2: Agri-business Technology-Based Small Firms Profile Data, 2013]**

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<sup>8</sup> This illustrates the difficulty of applying terms such as ‘early stage and ‘mature’ to TBSFs as their stages of development can differ and are not necessarily correlated with the age of the business.

## Findings and Analysis

The discussion of findings is organised against the main themes that have arisen from the analysis of the interview data. These include: the pattern of funding and attitudes to external funding, the role of government grants, the importance of both global and local networks for accessing finance and other perspectives on the New Zealand environment for funding.

### The characteristics of finance of TBSFs and attitudes to external funding

In study 1, there was a heavy reliance on internal funding and bootstrapping methods, as illustrated by table 1, although a number of TBSFs had managed to raise additional private capital through their own contacts and networks. All firms in this sample had relied upon internal funding to some extent, however, 13 (65 percent) of the TBSFs either relied totally on internal funding (from the initial start-up) or relied upon a combination of internal funding, and bootstrapping<sup>9</sup>. This can be compared with study 2 where a total of 17 (50%) firms relied mainly on internal funding; whilst still high, it is indicative of a more proactive seeking of external funding by 2013.

Evidence from study 1 indicated that the entrepreneurs would prefer to fund internally, using bootstrapping techniques where possible, even if it meant a slower and perhaps more even paced development:

*We have bootstrapped from the start; you have really got to know what you are doing with your cashflows and that is challenging” ----“Money earned was put back in the business to grow step by step. 1#13*

However, it would be incorrect to indicate that there was total aversion to raising external funding, but only a small number had raised venture capital (two companies) or had undertaken a search procedure for business angels. Even allowing for the expected reluctance of owners to dilute equity, there was a strongly held perception that the informal and formal venture capital (VC) markets in New Zealand were very limited and lacked sufficient numbers of high net worth individuals with experience of investing in technology-based companies. For example, one respondent who had sought VC funds in Australia and NZ commented that:

*We focus on highly worth individuals in Australia and New Zealand: that is the target market at the moment, because they are more likely to support a business in this part of the world. (However) the depth of capital markets is limited in New Zealand. The amount of risk capital is very low—and-- the pool for funding technology firms in New Zealand is incredibly low. 1#06*

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<sup>9</sup> Six firms were totally reliant on internal funding; four firms mentioned bootstrapping techniques, 11 firms relied upon a combination of internal funds and private investors, six firms used internal funds and government grants and only three firms were using either bank loans or overdrafts.

A further illustrative comment was made by one respondent that had raised some VC funds, but also pointed to the difficulty of raising funding offshore for amounts less than NZD5 million:

*It is hard work to get funding in New Zealand, because there are not many places to go. It is difficult to get funding outside New Zealand because we are typically too small. For a lot of VC organizations (who are looking to invest \$5million or more) the company is too small. Other opportunities are offshore but that is also harder, because we are not US-based. So we are restricted to where we can go. 1#16*

It is arguable that for TBSFs located in business incubators, the access to investors, especially business angels, is increased due to the network established via the incubator. Business incubators had sought to establish funds with money from their network of private investors through which applications could be made by early stage and start-up companies. Location in an incubator raises credibility and is likely to improve access to VC and equity. However, there was still a time consuming process to raise external individual business angel investment due to the matching process and the stages required before final investment might be secured.

*The good news about using angels linked to the incubator is that it's a real opportunity, so they do invest, but it's a long hard process to get their attention. 1#16*

In study 2, as mentioned above and indicated by table 2, there was more evidence of a willingness to raise and seek out external equity funding and venture capital. In two cases this was in evidence right from start-up. For example, with case 2#05, the respondent commented that the company was a corporate spin-out to exploit more adequately an opportunity (in dairy farming), but also was able to seek further venture capital.

*“When the business first started it was a spin-out from another company, with ownership just the same-----in our second round funding we have got some other VC investors.” 2#05*

With case 2#19, the respondent founding entrepreneur and owner commented on how they sought a business angel investor from the start.

*My co-founder---(name) ---we had a little bit of seed funding, (but) right away we started looking for an angel investor group –looking for \$200k—it ended up taking us two years ---a lot longer than we had planned. 2#19*

In study 1, the difficulty in raising VC funding locally in New Zealand meant that those that were actively seeking such funding were looking overseas, especially to the US.

*The first round capital raising (NZD500K) was needed for marketing and sales side of the business. The company got the funding but it was a long, slow and distracting process. Second round (18 months later) the company was cashflow positive and achieved the prior goal and raised NZD1.1 million for employing sales people. We were too small for the VCs, and the second time just too big to rely on angel investment.*

And-----

*For raising further funds, the VC market in the US will be approached instead of looking for funds in New Zealand, because it is for a larger amount of money. Angels will not be interested, but VC's might become so as we hit the low end of the VC market.* 1#16

The difficulties and immaturity of the New Zealand funding environment was still in evidence in study 2, especially for a company such as case 2#34, being a bio-tech company with long R&D periods for their projects. With this case, the entrepreneurs sought funding from an individual investor based overseas, which they were able to do through one of the founding entrepreneurs' own contacts.

*We found a private investor who (name of entrepreneur) we knew from another life, and he is a very wealthy Canadian and he came in and pretty generously supported what we do.* 2#34

In study 1, there was a distinct reluctance to raise external debt finance. Only a small number of TBSFs had sought and raised finance from the commercial banks. There was a view that banks are not willing to value intellectual property (IP). One respondent from a mature company<sup>10</sup> commented: “[Obtaining] debt financing is nearly impossible and we can't even get a bank overdraft facility” (1#03). Where bank finance had been secured, not surprisingly, it was property that had been used for collateral.

*“The business was funded by a bank loan, as much money as possible with the house as collateral. Nearly spent all that money (on product development), but made it back after the product launch”.* 1#15

The importance of the role of the commercial banks had changed little with study 2 and there was evidence of a “discouraged borrower” effect with respondents. For example, from study 2, case #31, a recent start-up (although previously a winery business with a financial track record) indicated that they were discouraged from applying for bank funding for expansion, because of the security requirements.

*“The banks don't budge, they won't give you anything even if you've got proven growth and you're doing well, they won't give you any money unless it is 100% secured.”* 2#31

With case 2#16, this time a well-established mature company, the owner was still very reluctant to use bank finance, preferring to grow more slowly, although the opportunity to borrow (from a bank) was available.

*“I never borrowed to grow and it meant that I grew a bit slower than some companies, but it meant that if anything went wrong, I wasn't going to lose my house”* 2#16

One of the implications of such a reliance on internal funding across the two studies meant that NPD periods were more lengthy than perhaps they might otherwise have been, or that

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<sup>10</sup> Established in 1996 and the largest company by FTEs in our sample from study 1

companies were reliant on funding from existing revenues and sales. An illustration is provided by case 2#07, a long established manufacturer. The respondent commented on their dependence on domestic sales to fund the development of opportunities overseas.

*We've relied on the domestic market as our way of making money, we make money in the domestic market, then you use that money to fund offshore opportunities, through organic growth or otherwise and the domestic market is not a big market. 2#07*

However, despite the existence of discouraged borrowing, there was still recognition of the importance of having a good relationship with the bank. For example, in study 2 with case 2#29, the founding entrepreneur, a fruit producer, reported how the greater recognition provided by winning local business awards had helped to attract the attention of commercial bankers to his company.

*Every company would need some more funding if they're going to grow at the pace that we're growing, when your company gets on the radar then you get the attention of financiers. Funnily enough this week, I've got a meeting today with ANZ, and tomorrow a meeting with Westpac, so they're all coming to me saying how can we help you, through these awards. 2#29*

### Business Angel Networks

Study 1 (table 1) indicated that companies were actively seeking business angel financing and individual investor equity financing overseas, this was partly because of the lack of business angel networks (BANs) in New Zealand at the time in 2011, although the business incubators such as Creative HQ in Wellington were active in establishing BANs. Since that study took place, there has been some more active raising of the profile of BANs with some regional networks established. By the time of study 2, a small number of our company respondents reported that they had successfully sought and raised either individual investor equity financing or business angel funding from a syndicate of business angels. A couple of cases from study 2 are illustrative. There is some evidence that fledging local and regional business angel networks have now become more mature and are actively investing in New Zealand TBSFs particularly in the agri-business sector, characterised by having affluent farmers or former farmers and producers active as business angels in the networks.

Case 2#19, an early stage company involved in bio-technology applications, the entrepreneur indicated that he had looked for a business angel syndicate from start-up (reported above) as he realised the need to attract such funding for the development of the company, which was eventually secured.

*We finally secured a local group of investors along with the New Zealand SCIF<sup>11</sup> Scheme. We've had them on board for 2½ years, there are five individual investors that formed an investment vehicle. 2#19*

He further commented on the advantage of having a local business angel network, located and based in the Hamilton area.

*The (name of syndicate) network, they were one of the first groups I pitched too and they eventually became the ones that invested, but it took a year and a half between the first pitch and them finally saying yes, in between there I pitched as far afield as the US. Why did it take so long?, well in the early days we really didn't have a lot more than an idea, a good idea, but not a lot of proof behind it and so I think the New Zealand investors were fairly risk averse compared to the others, but because we knew them, and they were local, they kept a watching brief over the progress we kept making and we kept meeting with them and they kept being interested, we just couldn't quite get them over the line -- fortunately we were in a position of being able to continue to fund it, taking the risk ourselves. In the end they came back and it's been great because they are local. 2#19*

The entrepreneur from case 2#33 was also able to raise equity from a regional business angel network, this time based in the Tauranga area.

*It was my company and I did an angel investors pitch and got the new shareholders in, because I'd taken (name of company) as far as I could go myself-----it was long winded, it was a hell of a lot more involved than what I thought it would be, but I think the benefits far outweigh the negatives --they are ----all enterprise angels which are Tauranga based, all of them ----are associated with the kiwi fruit industry. 2#33*

### Perceptions on the role of government grants

In both studies, not surprisingly, there was a uniform and consistent welcome from the technology-based entrepreneurs for support from government grants in the form of technology vouchers and direct grant funding. Grants and technology vouchers<sup>12</sup> were effectively free money which could be obtained in a series of stages or rounds. In one case, from study 1, the entrepreneurs commented that this source of funding was “critical for their business” (1#09). Further there was comment that the grants had made a difference to the TBSFs' capability and speed of development. For example, one respondent commented that:

*“It is a huge help, it could be financed internally but the opportunity wouldn't be exploited because the project is money intensive. It was immensely useful” 1#16*

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<sup>11</sup> The SCIF Scheme is a Fund operated by New Zealand Venture Investment, an early stage Co-Investment Scheme, which encourages early stage business angel financing through matching co-investment partners (see <http://www.nzvif.co.nz/seed-co-investment-overview.html>)

<sup>12</sup> Technology vouchers require the business owner to commit 'matched funding' to R&D to qualify, whereas the former technology development grants were granted mainly on a technical assessment of the project and required no matching commitment by the business owner.

As mentioned in the introduction, increasing BERD has been an objective of Government policy coupled with investments in a new institution, Callaghan Innovation. By 2013, with study 2, similar comments on increased capability were made by respondents. The following views are selected as representative of some experiences with the current (and previous) grant-based and voucher system.

*It (funding) definitely is useful and ---- we see there is support and there's money out there to support things you do. You might as well invest a bit of time to access that. You can choose the bits that are actually useful for you so you don't end up interacting in ways that are just soaking up your time and you are not getting anything back because you can knock it on the head if it's not working for you. --- and I suppose we haven't had any negative experiences either. 2#05*

*We would have done the trial anyway, but not to the scale that Callaghan's funding allowed. And we feel that having the trial R&D exercise go through Callaghan's approval process gave the R&D some legitimacy for DairyNZ and Ag Research to get involved. 2#26*

Several respondents mentioned a series of staged applications for grants which ranged from \$10k to over \$100k. However, such grants were for product development rather than later stage commercialisation. Our key informants indicated that there was a growing gap between government funding for early stage R&D and VC or business angel funding for later stage commercialisation. However, some applications were for very substantial funding and one respondent said that they had received \$7m from government sources with 'no strings attached'<sup>13</sup>.

Despite many companies benefiting from technology grants and vouchers, there was still a strong preference for tax relief for R&D, where expenditure on R&D can be offset against tax liabilities. To illustrate, we give a selection of views from three entrepreneurs and their experiences (2#01, 2#21 and 2#34) which support a tax credit system (rather than a solely grant-based system).

*I think the National Government got it completely wrong by removing that (tax break). I understand (the Minister's) reasoning that it would be very hard to police and there's a heap of Government tax money not being collected as a result of companies telling lies, but on the other hand ----- it's just enough incentive to keep you going you know. New Zealand (has very many) businesses like this (one), that are in their own niche, have got their own unique ideas about doing something better and we talk about it all the time. Now that tax break made a huge difference, it was fantastic. 2#01*

*Well I mentioned our R&D expenditure, so R&D tax relief would be a very good thing and I understand there is some sort of discussion paper around at the moment I saw*

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<sup>13</sup> In comparison to UK equivalents, such as SMART, the application process in New Zealand was much less rigorous. Once eligibility criteria had been met, technology grants and vouchers were awarded. This raises the issue of the risk of grant dependency in New Zealand, which may have an unintended effect of displacing private investors in an already narrow and immature early stage VC market.

*something about it. Because our clients are forest growers anything that is an impediment to their business is an impediment to our business so clearly getting the (tax relief) working again is important to us. 2#21*

*We could be bitter, but we came to a decision we'll take it, if it's available, you know the Canadian model of getting investment tax credits,--- it's a better way to do it. New Zealand has none of that. ---- Like most entrepreneurs we've got to do it ourselves, if there's some low hanging Government money, we'll take it, but you know if we're standing around waiting for the Government to be a critical success factor in our success, it's never going to happen, it's better that they stay the hell out of the way. 2#34.*

### Importance and role of networks for access to informal finance and information

We have established in our literature review that networks can be important for access to social capital, but they are also important for access to HNWIs and informal sources of finance from business angels and, potentially from venture capital companies. They were also a factor identified in our discussion of the importance of context. Therefore, we include an indicative section on the importance and role of networks and their relevance for access to resources and HNWIs as perceived by our respondents.

With incubator tenants, a common factor mentioned by respondents was the importance of advice on business development and market validation of technology, rather than any technical assistance. For example one respondent in this group commented:

*The incubator plays an important role in regard to advice and business development. The technical side of the idea is covered, but which steps to take for developing a business is lacking, so the incubator is helpful for that. 1#17*

Incubators provide important business advice and mentoring support as well as providing a level of credibility when start-ups approach investors, but this needs to be tailored to the changing needs of TBSFs as they develop. Changing advice needs was illustrated by one respondent as follows:

*The first mentor assigned was great for market validation, but rather different skills were needed for working in a web-based business. We changed to a new mentor and the new one sets direction and focus --(a sounding board and), as a voice of reason. 1#14*

External contacts and networks were obviously important for accessing markets, especially for those in overseas markets. As one respondent commented:

*Networking is huge for us—if being overseas for business, at least three telephone calls are made for networking purposes (that is, separate from the purpose of the visit to develop additional contacts) with--- the best overseas contacts are ex-pat Kiwis. 1#03*

Key relationships are part of a company's strategic networks which can be critical for the innovation process. Membership of strategic networks was important for all our TBSF companies in both studies, for sharing information, knowledge and for forming more strategic partnerships. This can be illustrated with the comments of the founding entrepreneur from case 2#05, a company that is a provider of dedicated software for the farming and related sectors. In this case, a woman founder who was a member of a recently formed group of women technology-based company founders, considered that membership was beginning to yield a number of benefits.

*You know I belong to group of women founders of tech businesses and so within that group we ----you know somebody knows a developer who's available, or they have done some contract work for them, and they will tend to be smaller business so there is that sort of sharing of resources and knowledge and there's probably all sorts of little pockets like that----, it's been going for about six months and it's been certainly clear as with the more times we meet and talk about things, is the experiences and the challenges are different for women and when you get together as a group, a group of women actually exchange information in quite a different way than a mixed group.*  
2#05

Although we mentioned in the literature review that there is evidence that TBSFs' strategic networks will be global in nature, our findings suggest that local networks were very important for some of our companies. For example, the entrepreneur from case 2#15, a provider of technology-based services to the farming sector, commented on how his local knowledge and networks had enabled the development of the company.

*I guess I have been involved in the industry for 10 or 12 years, it's just utilisation of those networks I guess --- so some people probably see the business and think that it's had huge growth and it's accelerated growth, but it's a result of 10 or 12 years of networking within the industry and then sort of pulling all that together in a short time which is what we have been able to do.* 2#15

Similarly with cases 2#28 and 2#31, companies involved in horticulture and beverage respectively, the entrepreneurs commented on the importance of local networks.

*The local networks have been very useful from that point of view. But I haven't participated in them, but (name of Director) still swears by them.* 2#28

*Because they don't see us a competitor, so we've collaborated on making (product) with other breweries, and we've bounced ideas off them and they've given us export contacts, and given us leads on tap outlets to get our product into different bars and outlets which has been great as well. Definitely networks are really important.* 2#31

The role of early adopters in local markets and local networks was important, not just as a testing ground, but also for demonstration purposes. The comments from the founding entrepreneur with case 2#05 indicated that their customers, New Zealand dairy farmers, were early adopters who can provide information to other potential customers.

*Because the majority of our customers we know are early adopters and are recognised as such in their communities, our strategy is to actually use them as the centre of the sale ----- because farmers sell to farmers, so they like to be able to go and talk to someone who has got it. 2#05*

Global networks, for some TBSFs, will be more important than local networks. For example, case #34, as mentioned previously, had no sales in New Zealand and maintaining contacts with clients overseas was important and, as the comment illustrates, actually going to see them as well.

*There's no substitute for going to see your customers and your prospects face to face, so we're at the closest 12 hours, and for our European customers we're 24 hours away just to get to them, so when we were building our collagen business we kind of neglected our raw tissue business, and we didn't go and see them for 2 years, and we wondered why business was shrinking, we just weren't keeping the home fires burning. 2#34*

However, at the risk of generalisation and contrary to some of the existing literature, the majority of companies in both studies stressed the importance of strategic local networks. These were particularly important for those companies in the dairy agri-business sector.

#### Perspectives on the New Zealand environment for funding

In both studies there were frustrations expressed at the nature of the New Zealand funding environment, particularly the fragmented nature of funding sources and the small pool of equity in capital markets. Thus, some companies inevitably looked to locate and develop off-shore. A lack of critical mass was seen to compound the narrowness and fragmented nature of sources. Although there is evidence of the development of some clusters of activity, such as the digital sector in Wellington, the limited nature of such technology-based clusters was seen as restrictive. For example, comments were made about the “*lack of critical mass*” and “*lack of experience*”.

*There are not many people to talk to, there is a very small group of people investing in IT and software and those who do invest are quite conservative. 1#19*

However, by far the biggest challenge was seen as securing external investment in their companies, especially over the longer term. It was perceived that there is a lack of investors willing to take a long term approach, with overseas investors looking to do things faster in line with the accelerator model (typically looking for product demonstration within a few months rather a year or more). This favoured ‘lean technologies’, notably IT and digital technology TBSFs rather than sectors with more intensive R&D such as bio-tech.

*Investors want a return on their investment, and the way they are forced to do that in New Zealand is to see you being acquired, it is unfortunate but that is because investors here can't see long term value in staying with you long term. They do not get the share/return, whereas the only way they succeed their return is for you to be bought out by someone else. 1#19*

Although there were some improvements in the funding environment by 2013, study 2 still indicated that the development of additional sources of equity such as local and regional BANs were still embryonic.

## **Discussion and Implications**

In this section we discuss our results in the light of our research questions. To do this we can take RQ1 and RQ2 together for the purposes of this discussion section.

RQ1: What are the characteristics of the finance of TBSFs in New Zealand?

RQ2: Has the finance of TBSFs in New Zealand changed over recent years?

There is still a strong preference for, and reliance on, internal sources with evidence of discouraged technology entrepreneurs in relation to both debt and VC funding. However, there are some changes in preferences evidenced by study 2. This could be because of the strategic importance of the agri-business sector, but the jury is still out on whether there has been a significant change in preferences from the demand-side and the stimulation of the external equity environment by the Government and economic development agencies on the supply-side.

At the time of undertaking study 1, there was evidence of a number of problems in the New Zealand funding environment for TBSFs:

1. A narrow base of BAs and VC funding.
2. A lack of BANs.
3. A lack of maturity and hence learning and experience.
4. Fatigue arising from the smallness of the equity markets and investors being drawn to other markets such as property, because of the length of time taken to make an acceptable return.
5. Angel investors and founders that were being increasingly ‘screwed down’ by VCs in terms of valuations<sup>14</sup>.

At the time, in 2011, although the role of government grants was seen to be positive, both in start-up and speeding up development phases, this was not sufficient to overcome some of the deficiencies in the funding environment in New Zealand, indicating the lack of a funding escalator process. Indeed this was reflected with a number of respondents seeking larger sources of funding overseas, particularly in the US. The role of debt finance could at best be seen to be marginal with marked reluctance of entrepreneurs to seek debt finance, giving further support to theory on discouraged borrowers as mentioned in our literature review.

By 2013, there was evidence of some important developments in equity markets and BA funding, although little had changed in debt markets. In 2011 we concluded that there was an external equity gap (Deakins and North, 2012, page 97) “There was evidence of a distinct

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<sup>14</sup> That is low valuations on early stage angel investor funded companies due to the limited and fragmented VC market.

finance gap in the external equity market in New Zealand. For amounts below \$1m these could be sought from networks of business angels, even though such sources were limited and restricted. If the funding sought was in the range \$1m - \$5m, this was likely to fall between the informal and formal venture markets”.

By 2013 there had been some movement and reduction in this gap and there is evidence of the emergence of specialised BANs, stimulated in part by the work of local EDAs. Certain agri-business TBSFs with viable business growth plans were able to seek and eventually find external equity. However, because this development is still at an early stage and appears to be targeted at specialised sub-sectors of TBSFs, albeit important sectors for New Zealand, we need to be careful in concluding that this has led to a significant change in the funding environment. For example, there is still evidence of an over-reliance on internal funds and evidence of a discouragement effect to apply for external funding.

Our findings give strong support for demand side pecking order theories of entrepreneurial finance (Myers, 2001). A difference in terms of New Zealand, however, is that this preferential order is reinforced by the context of the preferences of HNWIs. As discussed in our section on the importance of context, there is a historical preference of HNWI New Zealanders to invest in property rather than other assets, making any search procedure for business angels more difficult. The reasons for this strong preference by New Zealanders are complex and are probably culturally based, but traditionally New Zealanders have viewed property investments as a security for their retirement and a state superannuation scheme, the *KiwiSaver*, was only introduced in 2007 and is still a voluntary scheme allowing employees to opt out. Obtaining a supply side flow of equity investments from HNWIs is limited and still at an immature stage. There were signs that this was beginning to change, albeit slowly, as the EDAs sought to build networks of HNWIs. It seems that initial preferences of individual business angels will be in sub-sectors where they are familiar with markets and potential opportunities. The New Zealand commercial banks, although financially safe and secure and not affected by the GFC, are also a reinforcing element of the context. For the commercial banks, the well known investment preferences of New Zealanders for property meant that they had come to expect that security should be provided to signal commitment by the entrepreneur, yet this also meant that there were discouraged borrower effects from an expectation that credit would not be available from commercial banks without the collateral of personal property.

## **Conclusions**

Contrary to initial expectations, New Zealand’s relatively secure and stable financial credit institutions, namely the stability of the main commercial banks, have not provided a financial environment that has benefited TBSFs in New Zealand compared to their counterparts in other developed countries. The lack of a state sponsored loan guarantee scheme has also meant that the commercial banks have not been able to transfer their high risk loans to any secure basis and will always require 100% guarantees for risk-based projects from TBSFs. Hence, some of the comments of our entrepreneurs, from both studies, are not surprising and have contributed to a discouraged borrower effect in the technology-based

entrepreneurial communities in the main New Zealand urban areas of Auckland, Christchurch, Hamilton and Wellington.

Private equity and venture capital markets were considered to be narrow, fragmented and fledging throughout the post GFC period, even though there have been some promising developments that have seen activity grow, albeit from a very low base. From an economic development perspective, the emergence of Business Angel Networks (BANs), facilitated by the regional EDAs has been encouraging and has reflected the growing activity of business angels captured by the Angel Association for New Zealand. The development of BANs has harnessed latent individual sources of risk capital through networks based on agri-business and its sub-sectors such as individual farmers and fruit growers who are looking to invest in the sectors in which they have knowledge and experience. In addition, returning ‘cashed out’ entrepreneurs (who may have left New Zealand to grow their business) may also prove to be an important source of investment for seed and early stage TBSFs. However, later stage development capital and VC sources remain an issue with evidence that TBSFs are either forced to search for significant VC funding overseas or become takeover targets for MNCs. Government attempts to stimulate equity and VC markets through SCIF and NZVIF has had some effect, but this is primarily in early stage funding.

Direct government support for TBSFs has been through mechanisms such as technology grants and vouchers targeted at R&D and later stage growth and project development. Whilst such grants have been welcomed as being valuable by our entrepreneur respondents, they have not been without criticism. Some technology entrepreneurs expressed a preference for R&D tax credits rather than direct grants whilst others perceived grant mechanisms as too bureaucratic, discouraging some firms that would have had eligible projects from applying. Grants often carry high levels of deadweight (the investment in R&D would have occurred without financial support, perhaps at a later time or at a lower level), arguably resulting in some firms becoming too grant dependent, so the value of relatively high levels of state expenditure could be questioned. However, this would require a full economic evaluation to provide an informed opinion.

Rather perversely, the relatively stable financial environment in New Zealand has not benefited TBSFs who are looking for innovative sources of risk capital. For example, there has been little in the way of financial innovation in the supply of risk capital. New Zealand has, until very recently, nothing to compare with crowd funding platforms that have emerged in the US and the UK. TBSFs in New Zealand, far from gaining advantages in being located in New Zealand, an economy relatively sheltered from the post GFC economic climate, can be considered to have been resource constrained in access to financial capital.

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**Table 1: Study 1: Technology-Based Small Firms Profile Data, 2011**

TBSF	Sector	Location	FTEs	Respondent	Primary Funding
1#01	Bio-pharm	Wn	10	FE	Internal
1#02	Software dvpt	Wn	5	FE	Internal
1#03	IT systems	PN	42	FE	PE
1#04	Electronics prdt	PN	4	FE	Internal (btstp)
1#05	Software dvpt	Wn	4	FE	PE
1#06	Bio-pharm	Wn	3	FE	PE
1#07	Software & IT systems	PN	12	FE	Internal
1#08	Software dvpt	Wn	8	FE	Internal (btstp)
1#09	GPS application & prdt	PN	5	FE(s)	Internal
1#10	Media & film prdn	Wn	17	L&AD	PE
1#11	Construction prdt	Wn	3	MD	Internal
1#12	Software dvpt	Wn	21	MD	Internal (btstp)
1#13	Software dvpt	Wn	19	FE	Internal (btstp)
1#14	Admin & support prdt	Akl	1	FE	Internal
1#15	Photographic & optical	Akl	2	FE	Internal = bank
1#16	Software simulation	Akl	31	MD	BA + VC overseas
1#17	Computer networking	Akl	2	FE(s)	Internal
1#18	Interactive software	Akl	3	FE	BAN overseas
1#19	IT systems	Akl	2	FE	BAN
1#20	Interactive software	Wn	5	FE	Internal

**Table 2: Study 2: Agri-business Technology-Based Small Firms Profile Data, 2013**

TBSF	Agri-business sub-sector <sup>15</sup>	Location	FTEs	Respondent	Primary Funding
2#01	Agricultural eqpt (mftr)	Ctb	16	FE	Internal
2#02	Agricultural eqpt (mftr)	PN	30	FE	PE
2#03	Fertiliser solutions	PN area	25	FE	PE
2#04	Agricultural eqpt (mftr)	PN area	1	FE	Internal
2#05	Software & farm mgt	Wn	3	FE	CV
2#06	Software & fin mgt	Wn area	30	FM	Internal
2#07	Large earthmoving eqpt (mftr)	Wn area	65	NPD	PE
2#08	Dairy farming eqpt (mftr)	Wn area	12	MD	CV
2#09	Agricultural engineering	PN area	43	FE	Internal
2#10	Farm eqpt (mftr)	PN area	20	FE	Internal
2#11	Animal feed	Ctb	15	NPD	PE
2#12	Dairy farming eqpt	Ctb	3	FE	Internal
2#13	Animal feed	Ctb	13	NPD	CV
2#14	Flax and oil processing	Ctb	8	FE	Internal
2#15	Farm services	Ctb	7	FE	Internal
2#16	Remote telemetry	Wn area	18	FE	Internal
2#17	Fertiliser & seeds	PN area	12	FE	Internal
2#18	Aborculture	Hm	3	FE	Internal
2#19	Biotech	Hm	4	FE	BA
2#20	Vanilla processing	Hm area	3	FE	BAN
2#21	Biotech	Hm area	6	FE	CV
2#22	Remote monitoring	Akl	8	NPD	Internal
2#23	Mowing equipment (mftr)	Akl area	25	GM	VC
2#24	Aerial photography	Akl	18	MD	PE
2#25	Bio-based application	Akl area	2	FE	Internal
2#26	Water technology (mftr)	Akl	31	MD	PE
2#27	Effluent control	Akl	4	FE	Internal
2#28	Hydroponic systems	Akl	9	MD	Internal
2#29	Organic fruit prdcr	Akl area	24	FE	Internal + bank
2#30	Animal tags (mftr)	Akl	80	FE	PE
2#31	Craft cider brewer	Akl	4	FE	BA
2#32	Engineering systems (mftr)	Wn area	35	NPD	Internal
2#33	Fruit producer	HB	9	FE	BAN
2#34	Biotech	HB	11	FE	BA (overseas)

<sup>15</sup> Firms were selected and recruited if involved in R&D and technology development applied to the agri-business sector

**Key for Tables 1 and 2**

Location	Akl	Auckland	PN	Palmerston North	Wn	Wellington
	Ctb	Canterbury	Ham	Hamilton & Waikato	HB	Hawke's Bay
Respondent	FE	Founding entrepreneur(s)	MD	Managing Director	L&AD	Legal & Admin
	NP D	New product development manager	FD/ M	Finance Director/Manager		
Finance	BA	Business Angel	PE	Private Equity	BAN	Business Angel Network
	CV	Corporate venture	btstp	Bootstrapping specifically mentioned		