

Network Effects Across Equity Crowdfunding Platforms: Evidence from the New Zealand Market

Abstract

Network effects across New Zealand's equity crowdfunding platforms are revealed by tracking shareholders who invest in multiple companies. A clear majority of these shareholders invest in companies using the same crowdfunding platform, despite the ease with which they could invest through other platforms. Multiple investments through a single platform occurs most for the Snowball Effect platform. Multi-platform investment is less common but when it does occur is strongest across the Snowball Effect and Equitise platforms, partly due to a group of associated companies using both platforms. The results make important contributions to our understanding of market structure in equity crowdfunding. The results are also informative for companies planning equity crowdfunding campaigns, especially if the company does not have its own large supporter network. The findings also suggest that platforms wanting to build their investor network should identify and attract companies with large networks; companies connected through existing venture capital networks are particularly valuable as they connect to both investors and companies.

Introduction

Equity crowdfunding platforms, like other financial intermediaries, are two-sided networks connecting companies with investors. This exploratory study of the presence and implications of network effects in equity crowdfunding aims to answer the research question: can individual equity crowdfunding platforms capture network effects or do multiple platforms act as a unified market? Answering this question will indicate whether network effects are strong enough for companies to prefer dominant platforms, and will competitive forces limit the number of viable platforms.

Selling shares to the public through licenced equity crowdfunding platforms has been legal in New Zealand since April 2014. Ten platforms have been authorised by the New Zealand Financial Markets Authority (FMA). Two platforms surrendered their licence after supporting a single unsuccessful crowdfunding campaign, see Table 1. Together the Snowball Effect and PledgeMe platforms dominate New Zealand's equity crowdfunding market, see Table 2, but with growing competition from Equitise, AlphaCrowd and Crowdsphere. Across the operational platforms competition for quality companies and shareholder funds is high.

Table 1 Licenced New Zealand Equity Crowdfunding Platforms

<i>Platform</i>	<i>Authorisation Date</i>	<i>Deregistration</i>
<i>PledgeMe</i>	30/07/2014	
<i>Snowball Effect</i>	30/07/2014	
<i>Crowdcube / Crowdsphere</i>	4/11/2014	
<i>Equitise</i>	22/12/2014	
<i>My Angel Investment</i>	16/03/2015	30/06/2016
<i>Liftoff</i>	15/06/2015	27/03/2017
<i>Propellar / Crowd88</i>	10/07/2015	
<i>AlphaCrowd</i>	23/10/2015	
<i>Collinson Crowdfunding</i>	28/11/2016	
<i>Fulqrum</i>	6/12/2016	

Some platforms have reacted to the competition by positioning themselves as niche market providers; Snowball Effect as a more select platform for larger companies, AlphaCrowd concentrates on the technology sector, Equitise activity seeks Australian companies and

investment by qualified Australian investors.¹ PledgeMe, in contrast, has accepted a wide range of companies. Fulqrum has positioned itself as a property investment platform, similarly Collinson Crowdfunding's first offer, ongoing at the time of writing, is for property investment. However, as Table 2 shows these approaches have produced variable results.

Table 2 Equity Crowdfunding Campaigns

PLATFORM:	Successful	Unsuccessful	Total	SUCCESS RATE
PLEDGEME	16	15	31	51.6%
SNOWBALL EFFECT	22	3	25	88.0%
CROWDCUBE/CROWDSPHERE	3	2	5	60.0%
EQUITISE	12	8	20	60.0%
MY ANGEL INVESTMENT	0	1	1	0.0%
LIFTOFF	0	1	1	0.0%
ALPHACROWD	<u>2</u>	<u>4</u>	<u>6</u>	<u>33.3%</u>
	55	34	89	61.8%

Established platforms with a strong investor network should attract companies by offering better chances of successful fundraising. However, it is a straightforward process for investors to register and follow multiple platforms, broadening the range of companies in which they can invest. Shareholders investing through multiple platforms will undermine a platform's attempts to capture network effects.

Network effects within and across platforms are detected by observing common shareholdings across companies. Network effects will show through shareholders investing in multiple companies. If individual platforms can capture network effects, then pairs of companies using the same platform will have more shareholders in common than company pairs across different platforms. Shareholder data, from thirty-five crowdfunded companies and five crowdfunding platforms, was obtained from public filings on the New Zealand Companies Office website.

Results indicate that network effects are stronger within platforms than across platforms. However, within platform effects vary across the five platforms. While there was almost no

¹ Australia's new crowdfunding legislation will allow equity crowdfunding beyond their existing twenty public shareholder limit. Equitise has an established presence in Australia and other New Zealand platforms are expected to investigate expansion into that market.

cross ownership in the companies before their crowdfunding, after crowdfunding 21.3 percent of shareholder accounts, held by 13.7 percent of the shareholders, are common to at least two companies. Around two-thirds common accounts are for companies using the same platform. Network effects are strong within the Snowball Effect and Equitise platforms, but are weaker for PledgeMe and Crowdsphere. It is common for a quarter of shareholders in Snowball Effect companies to have prior crowdfunding investment, so companies benefit from using the Snowball Effect platform as the Snowball Effect investor network means a successful raise is more likely.

Network effects across platforms are strongest where Snowball Effect investors are also using PledgeMe and Equitise. Equitise has benefitted from a group of associated companies using both Equitise and Snowball Effect as this helped raise awareness of Equitise among Snowball Effect investors.

Network Effects and Equity Crowdfunding

Network effects arise from positive returns to scale as more users connect to a business platform. Same-side effects arise from economies of scale on one side of the network. Cross-side effects arise from increased scale on one side of the network benefiting the other side, Katz and Shapiro (1985). Networks are a common feature of financial markets. For example, Economides (1993) found that individual equity markets maintained sufficient differentiation to keep each network separate and valuable to companies and investors.

Unlike the secondary markets Economides (1993) studied, equity crowdfunding platforms are primary markets, nevertheless the general principles of network economics apply. Like other financial intermediaries, equity crowdfunding platforms are two sided networks with both same-side and cross-side effects. Crowdfunding platforms differ from established financial markets in the number of similar, competing, platforms as there is little differentiation between platforms. This adds an extra dimension to the network effects; whether competing platforms operate as a single network or as a series of networks depends on the extent to which users move across platforms. Ultimately, the value of network effects depends on the complete network structure.

On the investor side, there are clear returns to scale for platforms as a larger pool of potential investors increases the probability of successfully funding a company and the individual

platform receiving its commission. Being part of a large network of investors means each individual investor can keep investment in any one company small, which limits their risk exposure.

Economies of scale are less apparent on the company side. Companies bring their networks to the market, creating a pool of potential investors for later companies. However, there are diseconomies of scale when funding is limited, as spreading limited funds between too many companies leads to fewer achieving their minimum target and platforms receive less commission. This suggests individual platforms need to be selective and choose companies more likely to succeed. However, across multiple platforms coordination problems are likely to occur and there will be times when too many companies seek funding.

Cross-side network effects are generally positive. Companies benefit from increased access to investors as it makes it more likely the funding target is realised. Investors benefit from having a wider range of companies to invest in as it allows them to select appropriate investments to diversify their portfolio. Both the range of companies and pool of investors will be greater when crowdfunding platforms act as one unified market.

Horvát, et al. (2015) examined network effects in peer-to-peer lending using internal data from Prosper. Past lending or borrowing connections created networks providing around four times more investment in future borrowing. It was also possible to examine reciprocity with this data. An individual who has acted both as a borrower and a lender was more likely to lend to people who had lent to them.

Signalling in Equity Crowdfunding

A key feature of crowdfunding is that more experienced and knowledgeable shareholders help certify and signal the quality of each company, Burtch, et al. (2013). In practice equity crowdfunding platforms support signalling by providing live updates on each campaign so interested investors can see how much has been pledged and by how many shareholders. Generally, there is not enough information to identify which shareholders are members of the general-public. Professional investors can choose to maintain a public profile letting the general-public know where they are investing.

Signals are diluted when there are too many good campaigns competing for funds. Parker (2014) argued that in this situation uninformed investors will spread their investments over

many companies as there is no clear signal from informed investors showing which companies provide the best investments. This, in turn, results in quality companies failing to receive sufficient investment, a clear diseconomy of scale.

Another perspective on signalling is the granting of legitimacy to social enterprises. Lehner (2013), Frydrych, et al. (2014) and Lehner and Nicholls (2014) saw alternative financing methods suiting social investment situations where traditional, profit focussed, finance models did not apply. Investment signalled legitimacy for the social venture, compensating for limited financial information. Although New Zealand equity crowdfunding companies are for-profit entities there is often a social or environmental element to their operations. Traditionally social enterprise promoters were restricted to seeking funds in their own private network but, with developments in internet communications and the introduction of crowdfunding platforms, promoters can now access much more diverse networks. Frydrych, et al. (2014) also saw legitimacy signals in a campaign's initial acceptance by a crowdfunding platform, not just in the subsequent investment.

Networks and Social Media

The focus of network effects in prior literature has been on the role of social media networks. Social media is commonly used in non-financial crowdfunding, Hazen (2012), but as social media appeals to the general public its use for financial crowdfunding would be illegal in many jurisdictions unless the law allows the promotion of equity crowdfunding campaigns to the general public. As laws, like New Zealand's, allowing public issues are a recent development most research on social media in project crowdfunding.

Crowdfunding companies use social media networks to promote the campaign but ultimately fundraising is more than what social networks are designed to offer. Examining investor motivations across three different platforms Ordanini, et al. (2011) found funding motivation corresponded to the type of crowdfunding platform, the profit focussed platform attracted profit focussed investors whereas social outcomes were associated with the charity platform. Initial funding was rapid and driven by the promoter's network, this was followed by slower investment growth through the crowd. In some cases Ordanini, et al. observed a third, 'race to be in' where early investment signalled strong investment potential, resulting in strong capital growth towards the end of the campaign. Interestingly, despite the usual signalling

arguments suggesting investment from those close to the promoters being critical, the second stage was most important. If the second stage went too slowly the project was likely to fail, suggesting the platform's network and the external network is more important than the promoter's social network.

Social media has an important role in building networks for equity crowdfunding platforms. Belleflamme, et al. (2015) observed that in an efficient market success would simply depend on the quality of the offer, but as equity crowdfunding markets are not efficient social networks become important tools for spreading information. For example, using data from the United Kingdom Vismara (2016) found that founders with larger social networks have greater success in equity crowdfunding. Similarly, Mollick (2014) found Kickstarter success corresponded to the size of the associated social media networks.

As platform fees are dependent on successful projects, platforms want a high number of quality projects and projects that will attract media attention to bring in new backers and expand the network. Agrawal, et al. (2014) argued that the wealth of a creator's social networks, as much as offer quality, affects results. Social networks provide direct benefits through investment by members and indirect benefits through signalling the company's quality.

In equity crowdfunding there are three relevant investor groups; investors in the company's network, investors in the platform's network, and external investors not part of either network. Investors already in a company's network add value to the platform as they are cheaply acquired, increase the chance of the company reaching its target and become part of the platform's network for future offers. Their potential contribution to fundraising is reinforced by Baeck, et al. (2014) who show companies see social media and social networks as an effective route to potential investors, and that fundraising failure is often attributed to failing to get their network engaged. Investors already in the platform's network are those who have registered to invest in previous offers or are interested in the platform's future offers. Logically a company should prefer a platform with a large existing network as it increases the chance of successful funding. External investors benefit both the company and the platform, but for any given campaign how many will invest is an unknown quantity.

Social media data has been used to estimate network size in other crowdfunding research. For example Vismara (2016) used the number of LinkedIn contacts as a proxy for social capital before the crowdfunding campaign and Mollick (2014) measured social network size by the number of Facebook friends of founders, at time of the research. A more recent interpretation of social media's role by Neiss and Monaccio (2017) found that the size of a social media network is relevant but in some cases but the effect is moderated by industry sector. For example, in consumer-focussed industries, where social media is important, social media network size was strongly linked to success. Whereas in other industries where social media had less of a role in company success it also had less connection to crowdfunding success.

Care is necessary when interpreting these studies as there are practical issues with using social media data. Historical data is rarely available and if social media data is collected after the crowdfunding campaign it is impossible to determine causality. Will a large network lead to crowdfunding success, or will crowdfunding success lead to a large network of followers? This issue is why Pitschner and Pitschner-Finn (2014) did not use social media data in their study of crowdfunding by non-profits. Other problems are that social network size may not be fully visible due to privacy settings and some followers may be 'bots' not people.

Competition between Crowdfunding Platforms

Strong network effects lead to markets dominated by a small number of platforms. This is consistent with Agrawal, et al. (2014) who observed that project crowdfunding in the United States was historically dominated by a single platform, originally Sellaband, which was solely for the music industry. Kickstarter later became the dominant platform.

Most empirical research is limited to single crowdfunding platforms, so analysis of competition between platforms is limited. Economides (1993) argued that one feature of financial networks was the unpriced supply of market information to rival networks, making it easier for one network to attract members of another network and undermine competition. With each platform being a network itself, and the set of platforms a larger network, the way for an individual platform to set itself apart from the other platforms is to put in place standards that make moving to other platforms expensive for companies and investors. Accordingly, switching costs, in the form of rules and standards, become an important

determinant of a network being able to capture network effects and add value to client companies. Standardisation, on the other hand, would make it easier for companies to switch to the dominant or cheapest network putting smaller or costly networks out of business.

Equity crowdfunding exists in a low regulation environment to minimise the costs to small business. In New Zealand this means that there is no disclosure standardisation imposed by legislation, however, Murray and Robertson (2017) show informal disclosure norms have developed around the two main platforms. There is differentiation between the two main platforms in the Snowball Effect supporting larger, more established companies seeking more investment, Murray (2015). If the platforms can avoid standardisation around a single norm then there is a greater chance that multiple platforms will survive.

Another aspect of the standardisation issue concerns the compatibility of assets sold in similar networks. In the crowdfunding context compatibility means companies using one platform are suitable investments for investors using a different platform. Both Katz and Shapiro (1985) and Economides (1993) observe that increased compatibility increases overall welfare within the network; the network is not limited to individual platforms but comprises the set of platforms. Shareholders should seek diversification by investing in compatible companies across a range of industries and at various stages of development. Platforms can differentiate themselves by specialising in one type of company, while shareholders invest across multiple platforms to access a range of companies.

Methodology and Data

Network effects, across competing equity crowdfunding platforms, are detected by looking for common ownership in companies using different platforms. If one platform can claim it has a large, exclusive, network of investors then it will be able to charge companies a premium for its services or use its position to dominate the market. To the extent that shareholders are investing in companies across multiple platforms then the value of network effects, for individual platforms, is reduced. However, investing across multiple platforms should benefit investors by providing them with a wider range of investments and more diversification.

The population of interest consists of all New Zealand resident companies successfully completing an equity crowdfunding raise from public investors by 31 December 2016. Forty-four successful campaigns were identified from the platform websites. Three foreign

registered companies were excluded, and three companies undertaking repeat campaigns only had their initial campaign included. Public records for the remaining thirty-eight companies, on the New Zealand Companies Office website, provided full shareholder lists for thirty-five companies. Of these fourteen companies had raised funds through the Snowball Effect platform, eleven through PledgeMe, six through Equitise, three through Crowdcube/Crowdsphere, and one through AlphaCrowd.

The data does not include all network participants, so network effects are underestimated. Firstly, the dataset excludes companies for which shareholder data was not available so it is not possible to identify which shareholders were introduced to the networks by these companies. Secondly, the data does not distinguish between investors who found their own way into crowdfunded investment and which had been introduced through prior connection to a crowdfunding company. Thirdly, the PledgeMe platform also supports project crowdfunding and peer-to-peer lending but it is not possible to identify which equity investors had already joined the broader PledgeMe network through these other forms of crowdfunding. Data on PledgeMe's website shows that many equity investors have also pledged to other campaigns, but not the sequence of pledges, so it is not possible to tell which form of crowdfunding first attracted them to the platform. Lastly, there is no data from failed offers. Even though these offers attracted few investors to the network, the host platform still collects contact details and can market future campaigns to these investors.

Pre-crowdfunding shareholder data shows that most companies were closely held, as expected, before crowdfunding. Twenty-one companies had fewer than ten shareholders, and only five companies had more than twenty.

The post-crowdfunding data contains 5485 records, with 4314 distinct investors. Inspection shows 594 shareholders investing in multiple companies, including one who had invested in twenty of the thirty-five companies.

Each account is categorised: corporate, individual, or joint. Corporate includes companies, trusts, and investment funds. Individual applies where there is a single, non-corporate investor. Joint accounts have multiple owners, these often appear to be family accounts but there is insufficient detail to clearly separate family from non-family joint accounts. Post-crowdfunding shareholdings are predominantly individual with 90.7 percent of single

investments and 96.6 percent of multiple investment accounts, a breakdown of shareholder types is in Table 3.

Table 3 Post-crowdfunding Shareholder Types

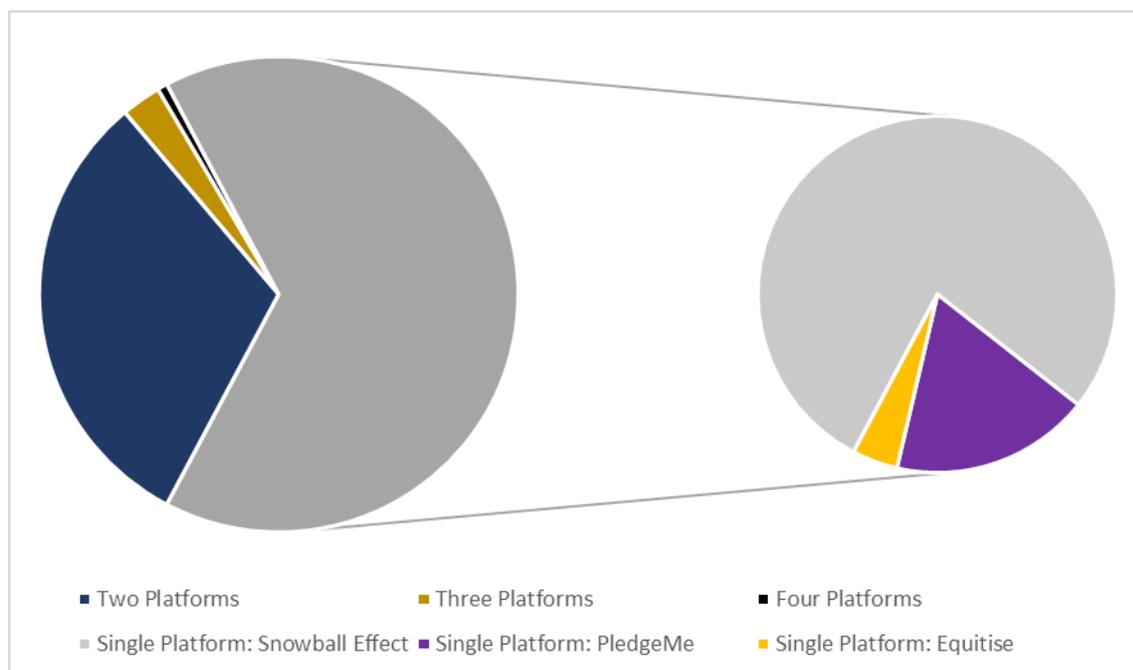
	<i>Single Investment</i>	<i>Multiple Investments</i>	<i>Total Investments</i>
<i>Corporate</i>	198	15	213
<i>Individual</i>	3374	574	3948
<i>Joint</i>	148	5	153
	3720	594	4314

Network effects across multiple platforms are detected by identifying shareholders who make multiple investments to see if they are keeping to a single crowdfunding platform, or investing over multiple platforms.

Figure 1 breaks down platform use by these investors. Around two-thirds keep to a single platform, mainly The Snowball Effect. Most of the remainder limit themselves to two platforms, mainly The Snowball Effect and either PledgeMe or Equitise. No investors are observed across all five platforms, although that should not be a surprise as there are few companies and limited data for the smaller platforms.

Networks are comprised of actors (nodes) and relationships (links). Here companies provide 35 network nodes ($N=35$) and common shareholders link between each node pair. Treating these as non-directional links means there are $(N^2 - N)/2 = 595$ possible linked pairs of companies, Knoke and Yang (2008). Of these 134 company pairs, 22.5 percent, have no common shareholders. The existence of platform network effects will be evident in companies using the same platform having more and stronger links than companies using different platforms. 164 of the 595 pairs, 27.6 percent, are for companies using the same platform.

Figure 1 Platform Choice for Investors Making Multiple Investments



Platforms used by the 594 investors making multiple investments. Chart on the left shows proportions using one, two, three, or four platforms. Chart on the right shows the platform used by investors only using a single platform.

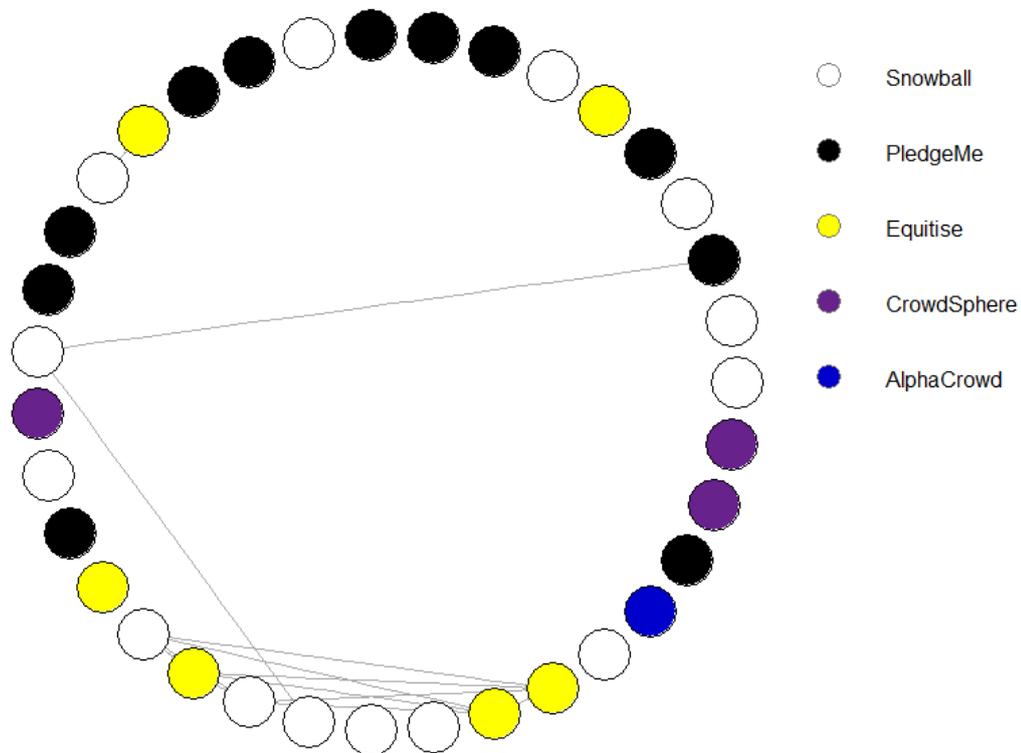
Results and Analysis

Three approaches are used to analyse the ownership networks. First, both pre- and post-crowdfunding ownership networks are mapped and differences in link strength examined. Second, company-pair comparisons are examined to see if features other than platform choice attract investment in company pairs. Finally, shareholders' crowdfunding investment history is examined to develop deeper knowledge of multiple investment activity and movement across platforms.

Network Maps

Pre-crowdfunding networks are mapped in Figure 2. Few companies had common shareholders before their crowdfunding campaign. There is one pair of companies linked by a single shareholder and a set of three companies linked by a different single shareholder. There was also one small pre-crowdfunding ownership network, with multiple connections, between a group of five companies. Powerhouse Ventures Limited, a small venture capital investment fund, is the key node in this network as it used equity crowdfunding itself and for four of its portfolio companies. Powerhouse Ventures and Motim both raised funds through the Snowball Effect while HydroWorks, Invert Robotics and CropLogic used Equitise.

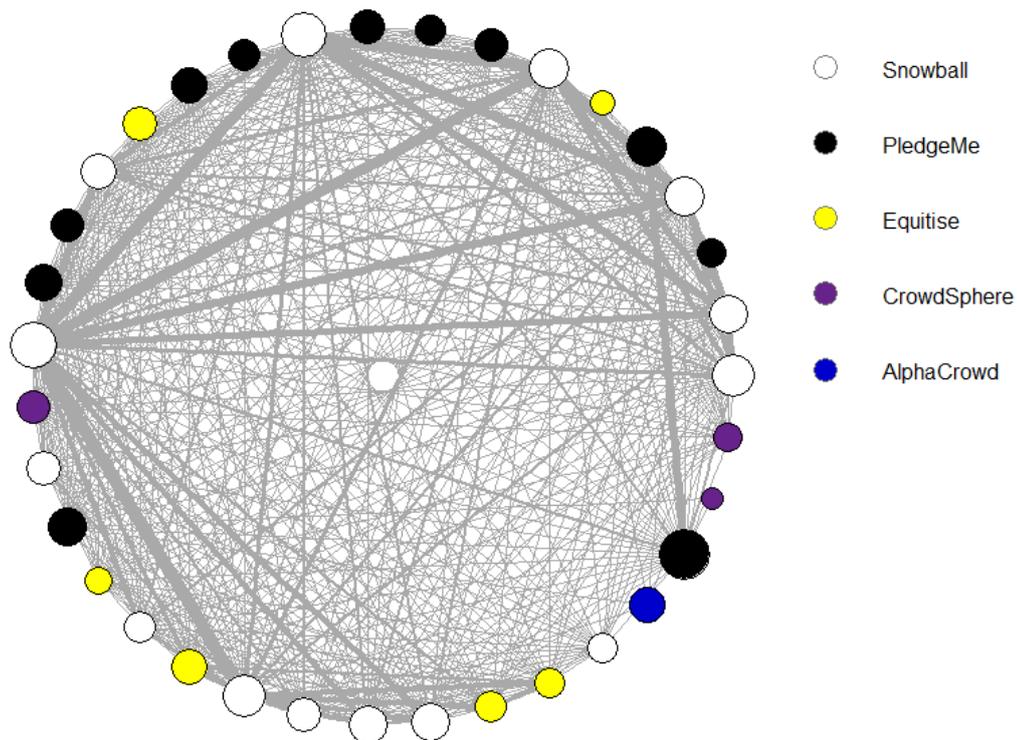
Figure 2 Ownership Networks Before Using Equity Crowdfunding



Network diagram of ownership links between thirty-five companies before they used equity crowdfunding. Each dot represents a company, colour coded by the crowdfunding platform they would later use. Lines represent common shareholders.

Post-Crowdfunding Networks are mapped in Figure 3. Over three-quarters of company pairs are linked. Closer inspection shows that the strongest links (thicker lines) are mainly between companies using The Snowball Effect platform. This is partly due to these companies being larger and having more shareholders, so there is a greater chance of having are more shareholders in common, it is also evidence of stronger network effects within the Snowball Effect platform. Comparing pre-crowdfunding and post-crowdfunding network diagrams shows that the links between the Powerhouse Ventures portfolio companies strengthen, but this is not uniform across all company pairs in the group.

Figure 3 Ownership Networks After Using Equity Crowdfunding



Network diagram of ownership links between thirty-five companies after equity crowdfunding. Each dot represents a company, colour coded by the crowdfunding platform they would later use, dot size is proportional to the log of the number of shareholders. Lines represent common shareholders with line thickness proportional to the number of common shareholders.

The strength of each link is calculated as the proportion of shareholders the two companies have in common. For example the two Snowball Effect companies with the largest number of common shareholders, 60, had 491 and 300 shareholders respectively, so $60/(491+300-60) = 8.21\%$ of the shareholders are shared. The pair with the strongest link had 16.36% of shareholders in common, these two companies had both used the Equitise platform.

Analysis of linked pairs, grouped by platform, is summarised in Table 4. The strongest links occur when companies both used either the Snowball Effect, 3.79 percent of shareholders in common on average, or Equitise, 3.57 percent of shareholders in common. Companies using PledgeMe have fewer shareholders in common, 1.79 percent on average, indicating weaker network effects for that platform. The only cross platform link greater than one percent is for Snowball Effect and Equitise, with 1.54 percent of shareholders in common, indicating some shareholder movement between these platforms. Overall Anova results indicate that each

group is different from the others and network effects are stronger with companies paired on the same platform than across platforms.

Table 4 Analysis of Variance for Ownership across Company Pairs

<i>SUMMARY</i>					
<i>Groups:</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>	
<i>Snowball & Snowball</i>	91	3.4513	0.0379	0.0005	
<i>PledgeMe & PledgeMe</i>	55	0.9813	0.0178	0.0002	
<i>Equitise & Equitise</i>	15	0.5354	0.0357	0.0018	
<i>Crowdsphere & Crowdsphere</i>	3	0.0229	0.0076	0.0002	
<i>Snowball & PledgeMe</i>	154	1.0993	0.0071	0.0000	
<i>Snowball & Equitise</i>	84	1.2908	0.0154	0.0003	
<i>Snowball & Crowdsphere</i>	42	0.2494	0.0059	0.0000	
<i>Snowball & AlphaCrowd</i>	14	0.0128	0.0009	0.0000	
<i>PledgeMe & Equitise</i>	66	0.4118	0.0062	0.0000	
<i>PledgeMe & Crowdsphere</i>	33	0.1079	0.0033	0.0000	
<i>PledgeMe & AlphaCrowd</i>	11	0.0035	0.0003	0.0000	
<i>Equitise & Crowdsphere</i>	18	0.1217	0.0068	0.0001	
<i>Equitise & AlphaCrowd</i>	6	0.0000	0.0000	0.0000	
<i>Crowdsphere & AlphaCrowd</i>	3	0.0000	0.0000	0.0000	
<i>ANOVA</i>					
<i>Source of Variation</i>	<i>SS</i>	<i>Df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>
<i>Between Groups</i>	0.0852	13	0.0066	33.1485	0.000 **
<i>Within Groups</i>	0.1148	581	0.0002		
<i>Total</i>	0.199972	594			

Company-Pair Comparisons

Following Katz and Shapiro (1985) and Economides (1993) investment across platforms is more likely when companies and investors are compatible across platforms. While collating the data it was noticed that some shareholders who invest in multiple companies appear to prefer investing in companies in the same industry. For example, companies operating craft breweries or in financial services. It is possible that investors are either attracted to certain types of company when standard finance theory suggests investors should instead seek out different companies to increase diversification. Regression models were estimated to test this relationship, with the ownership of each company pair as the dependent variable. Independent variables represented matching industry sectors, the absolute difference in company age, pre-funding valuation, and the maximum ownership percentage available to

crowdfunding investors. Using the same platform operated both as an independent dummy variable and to create sub-samples.

The matching platform dummy is the only significant variable in these models, presented in Table 5. Model statistics indicate that only the full sample model with the platform variable is better than its corresponding null model. These results show that having similar company characteristics such as size, age, and industry does not increase the likelihood of shareholders investing in both companies.

Table 5 Determinants of Ownership across Company Pairs

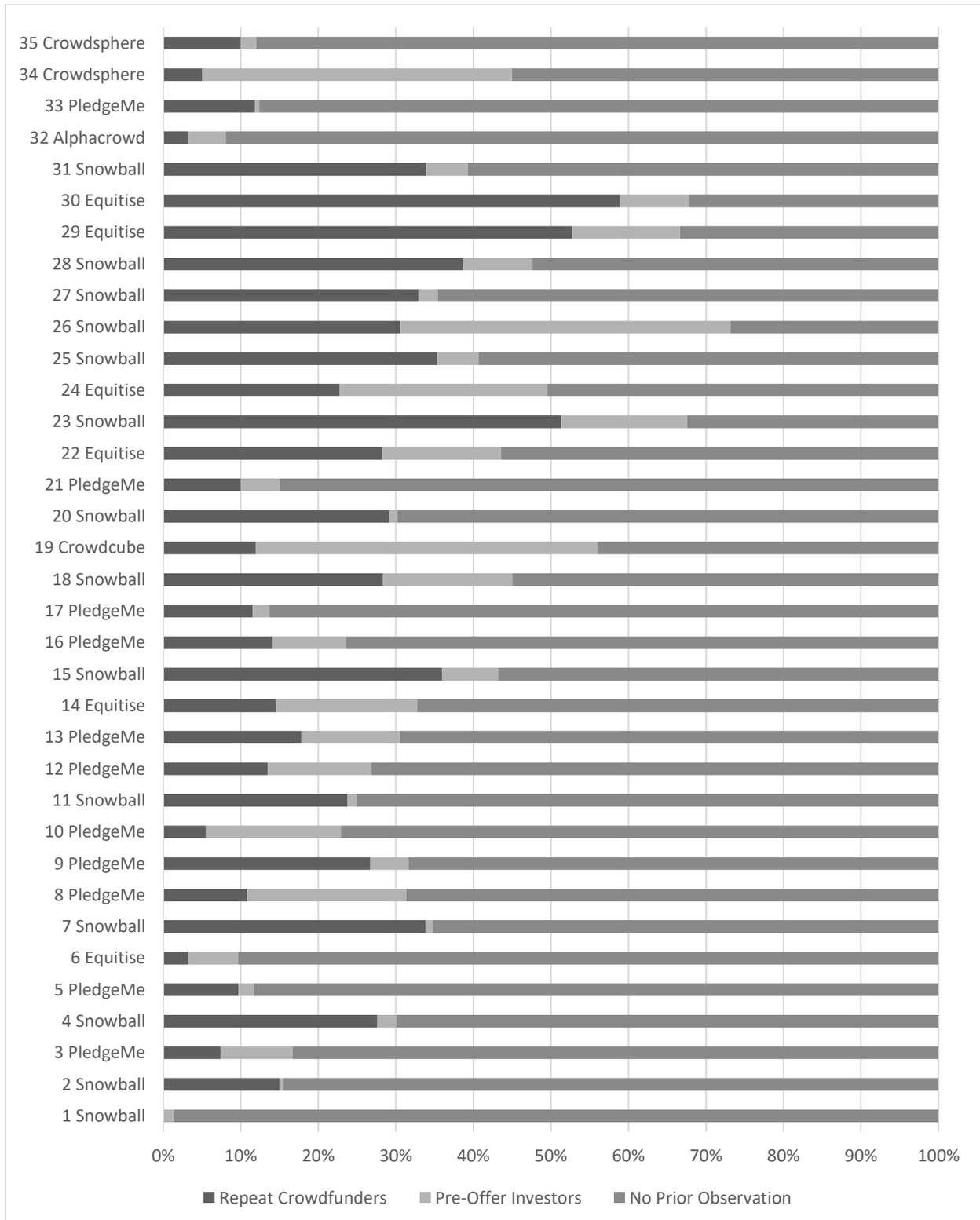
	<i>Full Sample</i>		<i>Unmatched Platforms</i>		<i>Matched Platforms</i>	
	<i>Coefficient</i>	<i>P-value</i>	<i>Coefficients</i>	<i>P-value</i>	<i>Coefficient</i>	<i>P-value</i>
<i>Intercept</i>	0.0065	0.0000	0.0072	0.0000	0.0276	0.0000
<i>PlatMatch</i>	0.0228	0.0000 *				
<i>IndMatch</i>	0.0014	0.3659	-0.0006	0.5773	0.0068	0.1667
<i>Age</i>	0.0001	0.6838	0.0001	0.5783	0.0001	0.7969
<i>MaxPercent</i>	0.0039	0.2454	-0.0018	0.4881	0.0173	0.0720
<i>PreVal</i>	0.0000	0.9715	0.0000	0.3884	0.0000	0.4431
<i>F-score</i>	53.1497	0.0000	0.4973	0.7377	1.3566	0.2517
<i>Adjusted R Square</i>	0.3051		-0.0047		0.0087	
<i>Observations</i>	595		431		164	

Determinants of the proportion of shared ownership for company pairs. Platmatch is a dummy variable indicating companies are using the same crowdfunding platform. IndMatch is a dummy variable indicating companies are in the same broad industry sector. Age is the absolute difference in age for the paired companies, MaxPercent the absolute difference in ownership offered to crowdfunding investors and PreVal the absolute difference in pre-crowdfunding valuation.

Shareholder Crowdfunding Investment History

The next stage of the analysis examines prior investment of shareholders in each company. Figure 4 shows the proportions of shareholders who have invested in earlier crowd-funded companies, pre-crowdfunding shareholders, and new investors. While the later Equitise offers have the greatest proportion of repeat investors, overall the Snowball Effect has been the most consistent in attracting repeat investment.

Figure 4 Source of Shareholders in Crowdfunded Companies



Source of post-crowdfunding shareholders for each sample company. Pre-offer investors are existing shareholders, repeat crowdfunders have been observed making prior investment in other crowdfunded companies, shareholders with no prior observation are new to the network. Labels on the vertical axis indicate the sequence and platform used.

There are strong network effects within the Snowball Effect platform. After the first two, early, companies there has been consistent investment in new companies by investors with prior equity crowdfunding experience. On average 29.7 percent of shareholders in Snowball Effect companies, post-crowdfunding, had previously invested in a crowdfunded company. Additional inspection of the raw data shows most of these investors were first observed investing through the Snowball Effect platform.

Network effects are weaker for PledgeMe. On average 12.6 percent of shareholders are investors in earlier crowdfunded companies. Inspection of the raw data shows that the first investment was most likely through the PledgeMe platform, but there is also a noticeable number of Snowball Effect investors willing to invest in PledgeMe companies. As mentioned earlier these figures will underestimate effect of PledgeMe's broader network as it is not possible to identify which investors had earlier joined the network though project crowdfunding or peer-to-peer lending.

There are strong and growing network effects within the Equitise platform. However, this is hard to separate from network effects across all platforms as many investors had previously invested through other platforms. Equitise benefitted from many investors who had earlier invested in Snowball Effect companies investing through the Equitise platform. Three later companies, all with high levels of repeat investors, are companies in the Powerhouse Ventures Portfolio, and it appears that by splitting its business across the two platforms Powerhouse Ventures has helped shareholders move across platforms. Interestingly Mosaic Enterprises Limited received significant cross-platform investment; although it is not associated with Powerhouse Ventures its Equitise campaign overlapped with HydroWorks' which is in the Powerhouse Ventures portfolio.

Network effects are limited in the smaller platforms. However, as few companies have successfully raised equity through these platforms data is limited. Data clearly shows that few investors in these companies have previously invested in other crowdfunded companies. This is despite the Alphacrowd and Crowdsphere companies raising funds towards the end of the sample period when a pool of experienced equity crowdfunding investors was well established. This indicates that the new platforms have had limited success in bringing

experienced crowdfunding investors into their network, and instead must rely on the fundraising company's network or attracting new investors to equity crowdfunding.

Other Observations

New Zealand's equity crowdfunding market is still in the early stages of its development. Strategic moves by platforms and companies will change the network structure as platforms compete for business and companies compete for funding. For example, while it appears straightforward for investors to move across platforms, it is not common for companies to move. During the sample period three companies undertook second round campaigns. All used the same platform they had originally used. Powerhouse Ventures switched platforms when it allowed Equitise to sell shares during its IPO, and in the second half of 2017 The Module Project Limited, a company that had raised funds through AlphaCrowd, undertook a successful second round campaign on PledgeMe. Smaller platforms wanting access to a larger platform's network should actively encourage successful companies to move platforms in the hope that this will increase their network.

Another development is two platforms, Equitise and Crowd88, encouraging investment alongside venture capitalists and angel investors. Crowd88 has a "Cornerstone Club" and Equitise offers "Syndicates" which signal professional investment and approval. If successful, this strategy will link the platform to larger investor networks. Bringing in professional investor networks could also help bring connected companies to the platform.

Conclusion

Equity crowdfunding platforms, like other financial intermediaries, are two-sided networks connecting companies to investors. Returns to scale are positive on the investor side, but can be negative on the company side as too many companies competing for finite funds will lower success rates and some quality companies will not be financed. Competition between platforms, for quality companies and investor funds, is strong. To capture network effects within a single platform there needs to be clear differentiation between the platforms or high transfer costs, but this is limited in New Zealand as low regulation keeps transfer costs low. For now, multiple platforms survive but need to attract investors from other platforms or bring new investors into crowdfunding.

Network effects exist both within and across equity crowdfunding platforms. The effects are stronger within individual platforms than across platforms. The Snowball Effect has many investors who limit themselves to investments through the one platform and Equitise has benefitted from those Snowball investors who are willing to invest across platforms. Multiple platform investment between those two platforms has been stronger following companies in the Powerhouse Ventures network raising funds using both platforms.

The results show that companies seeking equity crowdfunding should prefer using The Snowball Effect or Equitise, if possible. Platforms should also pay attention to a company's existing network when evaluating whether to host its campaign. The benefits of supporting well-networked companies is apparent in Equitise's experience with the Powerhouse Ventures companies. Although this would be difficult to replicate it provides guidance as to how a later entrant to the crowdfunding market can quickly build an investor network.

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