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Entrepreneurial uncertainty during the Covid-19 crisis: Mapping the temporal dynamics of entrepreneurial finance

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ABSTRACT

This paper illustrates how chronic uncertainty caused by crisis events affects the availability of entrepreneurial sources of finance for start-ups and small and medium-sized enterprises (SMEs). To explore this line of argument, this paper examines Crunchbase real-time data examining entrepreneurial finance investments in China during unfolding Covid-19 crisis. The paper shows that these equity investments slumped dramatically in the immediate aftermath of the Covid-19 virus, resulting in a year on year decrease of 60% in the total volume of investment raised between quarter 1 in 2019 and quarter 1 in 2020. Importantly, the paper found early-stage seed investments falling the steepest, suggesting nascent start-ups are those most heavily affected by the crisis. While the global financial crisis heavily hit debt markets, the relational nature of equity investments may mean entrepreneurial finance is even more susceptible to major upheaval caused by the Covid-19 crisis. Overall, enterprise policy makers need to become better attuned at monitoring real-time data sources to mitigate chronic entrepreneurial uncertainty via strategic policy responses.

1. Introduction

This paper illustrates how extreme uncertainty caused by crisis events affects the availability of entrepreneurial sources of finance for start-ups and small and medium-sized enterprises (SMEs). For over a century, uncertainty has long been recognised as a central pillar influencing entrepreneurial decision making (Knight, 1921). Uncertainty is defined as the “perceived [in]ability to predict outcomes in the general business environment accurately because of insufficient information or the inability to discriminate between relevant and irrelevant data” (Milliken, 1987, p. 136). During shocks and crisis events, levels of uncertainty escalate at such velocity their impacts become highly debilitating for entrepreneurs and entrepreneurial actors such as banks and investors (McMullen and Shepherd, 2006; Block and Sandner, 2009; Packard et al., 2017; Conti et al., 2019). Therefore, deciphering uncertainty is an integral part of ascertaining how entrepreneurship is impacted by a crisis such as the Covid-19 pandemic, especially given the potential ramifications of “financial distancing” between entrepreneurial firms and investors (Howell et al., 2020).

In recent years, levels of uncertainty have heightened considerably due to shocks such as, *inter alia*, major terrorist attacks (e.g. 9/11), the Gulf Wars, the global financial crisis (GFC), Brexit and, most recently, the Covid-19 pandemic currently engulfing the global economy (Buchanan and Denyer, 2013; Wenzel et al., 2020). Globalisation means the world economy is now much more economically inter-dependent and susceptible to systemic shocks such as the Covid-19 pandemic (Goldin and Mariathasan, 2015).¹ While the GFC was

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¹ In a play on the “butterfly effect” metaphor, Goldin and Mariathasan (2015) refer to this as the “butterfly defect”.

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transmitted worldwide instantaneously via financial markets, the Covid-19 pandemic was propagated virally via global pipelines of people travelling across the world. Judging by its economic impact in areas initially affected,² it seems that this crisis is likely to at least equal, if not surpass, the economic and societal dislocation caused by the GFC due to the hyper-uncertainty and devastation it has transmitted globally (Baker et al., 2020).

Real time data (RTD) is information captured and delivered immediately upon collection and falls under the wider rubric of “big data” which denotes the pervasive growth of data underpinned by advances in digital technology (Kitchin, 2014). While economists, finance and marketing scholars were quick to embrace “big data” as part of their methodological armoury (Varian, 2014; Cimadomo, 2016; Erevelles et al., 2016), entrepreneurs scholars have been slower to grasp this opportunity. It is now becoming increasingly recognised however that these novel and instantaneous data sources enable “substantial contributions to entrepreneurship research” (Obschonka and Audretsch, 2019; Schwab and Zhang, 2019, p. 843). We wish to argue in this paper that RTD offers a crucial mechanism for policy makers to better comprehend the impact of shocks, such as Covid-19 crisis, have for entrepreneurial activity.

Given the need for more rapid insights into how shocks translate into entrepreneurial uncertainty, this paper aims to answer the follow key research question: “how has uncertainty caused by the Covid-19 pandemic affected the levels and dynamics of entrepreneurial finance in China”. Whilst measurement of uncertainty admittedly poses formidable challenges (Packard et al., 2017), we wish to assess how entrepreneurial finance has been impacted since the outbreak of the virus. While some proxies used for measuring uncertainty are “far from perfect” (Bloom, 2014, p. 172), the crucial importance of entrepreneurial finance for start-ups and innovative SMEs (Hall and Lerner, 2010) makes this a powerful barometer of how uncertainty has affected entrepreneurial activity. As well as critical for *de novo* start-ups, entrepreneurial finance such as venture capital (VC) is also viewed as a vital means of facilitating blockbuster high technology entrepreneurship in the form of scale-ups who make a hugely disproportionate contribution to economic growth (Cumming et al., 2018; Cavallo et al., 2019).

The source of RTD explored within the current paper is Crunchbase data, which collated 13,729 funding transactions in China between 1994 and quarter 1 in 2020. Through a mix of artificial intelligence, machine learning, data analysts, community contributors and an investor network with more than 3700 global investment firms,³ Crunchbase broadcasts practically in real-time information about funding rounds undertaken by companies around the world. Herein, our unit of analysis is the funding round, i.e. the financing round where start-ups and established SMEs raise money to finance their operations and growth-related activities. In recent years, a number of studies have utilised this comprehensive and real-time sources of data to examine emerging trends within entrepreneurial finance (Cumming et al., 2019), including how VC levels were affected by shocks such as the GFC and the Covid-19 crisis (see Block and Sandner, 2009). While generally viewed as comprehensive, the data may be subject to some omissions, especially as seed stage deals by business angels can sometimes remain “hidden” (Freear et al., 1995).

While much of the debate on the impact of Covid-19 has thus far centred on existing SMEs (Bartik et al., 2020), nascent start-ups have received scant attention by comparison (Kuckertz et al., 2020). Therefore, this paper makes an important contribution to the entrepreneurship literature by examining the supply of entrepreneurial finance in China and how this has been impacted by the Covid-19 crisis. To the best of our knowledge this is the first paper to empirically examine the impact of the Covid-19 pandemic on entrepreneurial sources of finance in China, thereby making a valuable contribution to the growing volume of literature on crisis events and entrepreneurial uncertainty.

Overall, our findings suggest that the impact of the Covid-19 crisis has dramatically affected entrepreneurial finance in China to an order of magnitude significantly surpassing other more established markets such as the US (see Howell et al., 2020). It shows that the firms hardest hit are start-ups who benefit the most from early-stage seed finance. The empirical setting for this study is China which was the first country to encounter a major outbreak of the Covid-19 virus, potentially offering valuable empirical insights into how other countries across the globe may be similarly affected. In doing so it complements other scholars who have examined how previous crisis episodes impact entrepreneurial finance (Block and Sandner, 2009; Conti et al., 2019).

The remainder of the paper is structured as follows. First, we undertake a brief literature review of entrepreneurial uncertainty. Second, we outline the findings from our RTD analysis. Finally, the conclusion outlines areas for further RTD research.

2. Literature review

2.1. Exogenous shocks and sources of entrepreneurial finance

Over the last decade there has been a proliferation of empirical studies examining the impact of major exogenous shock events such as the GFC (Buchanan and Denyer, 2013; Doern et al., 2019). A key factor explored by the burgeoning literature examines how certain shocks have influenced the ability of innovative SMEs to obtain external finance. In order to grow, external finance is crucial for start-ups and SMEs (Cassar, 2004; Cole and Sokolyk, 2018). Some of these studies have carefully explored how bank lending to SMEs was affected by the GFC using traditional methods such as government surveys, business databases and official GDP data (Lee et al., 2015; Cowling et al., 2018; Brown and Lee, 2019; Demirgüç-Kunt et al., 2020). While there is a need for these robust studies to properly decipher the impact of the GFC *ex post*, these backward looking studies fail to yield much in the way of explanatory insights how policy could proactively deal with and mitigate the impact of these crisis periods as they actually unfolded. Ultimately, using retrospective research

² Industrial output in China fell by 13.5% in the first two months of 2020, representing the single largest contraction ever recorded (Financial Times, 2020).

³ “The Crunchbase Data Difference” Crunchbase, April 3, 2020, <https://about.crunchbase.com/products/the-crunchbase-difference/>

designs, means it is often difficult for researchers in this field “to engage in real time with the flow of events” (Buchanan and Denyer, 2013, p.215).

Another limitation with these studies is their strong orientation towards bank lending. To date, there has been substantially less evidence on the role that shocks play on the supply of entrepreneurial finance such as business angel investments and VC and how this impacts SMEs. While some studies found substantially reduced levels of VC during the GFC (Block and Sandner, 2009; Conti et al., 2019), other studies found sources of business angel finance to be quite resilient post-GFC (Mason and Harrison, 2015). While this evidence is somewhat thin and patchy, there are compelling reasons for examining how equity investments are affected by shocks. In the main, these investments are often allocated to the most growth-oriented and innovative start-ups making them a vital engine for long-term economic growth (Hall and Lerner, 2010). Importantly, a shortage of finance for new ventures is of crucial importance because research shows that start-ups born during recessions not only start smaller, they also tend to stay smaller in future years even when the macro-economic conditions recover (Sedláček and Sterk, 2017).

2.2. Entrepreneurial finance deals and uncertainty

Due to the high levels of uncertainty associated with finance for informationally opaque start-ups and SMEs, investors overcome this by extensive monitoring and control procedures (Kaplan and Strömberg, 2001). Indeed, a large body of work indicates that equity investors require close relational interactions and proximity (often face-to-face interactions) with their recipient firms (De Clercq; Sapienza, 2006). VC investors often use their personal networks to elicit deals and then oversee their investee firms by staying “close to their money” (Shane and Cable, 2002; Cumming and Dai, 2010; Colombo et al., 2019). Therefore, given the innately relational nature of entrepreneurial finance, there are strong, *a priori*, theoretical reasons for expecting sources of equity finance to be hit hard by shocks such as pandemics given the need for face-to-face contact between investors and entrepreneurs. Clearly, “financial distancing” may arise as a result of social distancing measures enacted by the Covid-19 crisis (Howell et al., 2020). It is a moot point whether new sources of technology such as online video pitches used in equity crowdfunding can mitigate the impact of the crisis given their potential role in reducing the need for personal interaction.

There are also important factors mediating various sources and types of entrepreneurial finance which may influence the impact of crisis events. First, past work clearly demonstrates that these funding sources are extremely volatile (Gompers et al., 2008). Examining historical data on VC investment activity, research has found that aggregate deal volume, capital invested, and deal size all decline substantially in past recessionary periods (Howell et al., 2020). Moreover, the same researchers found systematic evidence that investors who specialize in early-stage deals are significantly more responsive to business cycles than later-stage investors. Indeed, they found that the number of weekly early-stage VC deals during the Covid-19 pandemic declined by nearly 38% in the two months starting 4th March 2020, relative to the previous four months (Howell et al., 2020).

What factors could explain this differential impact on different types and phases of entrepreneurial finance? Late-stage deals are typically undertaken by large VC firms with well-established entrepreneurial firms which may make them more recession proof. For example, Airbnb famously obtained substantial venture capital in the aftermath of the GFC.⁴ Plus, large VCs typically undertake staged capital infusions into firms which have long-term timetables, often predicated on performance goals by recipient firms (Gompers and Lerner, 2001). Various scholars have invoked the concept of real options thinking to explain the sequencing of VC investments (Li, 2008; Hsu, 2010). Each venture capital funded project has project-specific uncertainty concerning the costs and benefits of the project. Project-specific information generally arrives when investment is taking place, so there may be little value in holding off investments. Consequently, a VC firm has the motive to invest sooner rather than latter so as to accumulate information to overcome informational opacity and agency issues (Li, 2008).

It is widely believed that early stage investments entail much higher overall risks and volatility of returns than later stage deals (Sapienza and Gupta, 1994; Parhankangas and Hellström, 2007). Plus, early-stage deals are often undertaken by a much wider and rapidly growing array of smaller scale equity investors such as, *inter alia*, specialist VCs, business angels, angel syndicates, incubators, accelerators and equity crowdfunding platforms (Block et al., 2018; Bonini and Capizzi, 2019). The smaller size of these investors may make them much less insulated from crisis periods than larger equity investors such as VCs. Often these investors have limited prior knowledge of the start-ups, hence the degree of risk is much greater. Adopting a “wait and see” approach is often viewed as a preferable course of action when faced with periods of uncertainty which may explain their greater vulnerability to shock events in these smaller investors (McKelvie et al., 2011).

In conclusion, entrepreneurial finance is heavily pro-cyclical in nature and this seems most pertinent for early-stage seed deals. Given the lack of previous work on this topic some have noted the need for more work to provide “potential explanations for extremely pro-cyclical early-stage VC investments” (Howell et al., 2020, p. 7). There also seems a dearth of evidence of how this situation plays out in different institutional and spatial contexts.

3. Summary of results

From our analysis of the Crunchbase data it is quite evident that the Covid-19 crisis is having a discernible and substantive impact on the marketplace for equity finance within the Chinese economy. Overall, between the first quarter of 2019 and the first quarter of 2020, China saw a reduction in the value of entrepreneurial finance investment raised fall by a full 60% (see Table 1). Below we outline the

⁴ <https://www.businessleader.co.uk/10-businesses-created-during-a-recession/83873/>

Table 1

Number of transactions and volume of investment raised (in USD) plus their respective differences compared with similar previous period (Year – Year; Quarter – Quarter).

	# of Transactions	% Difference (Transactions)	Investment Raised (in USD)	% Difference (Investment Raised)
2015	1014		\$25,096,015,694	
Qtr1	253		\$6,551,083,885	
Seed	87		\$80,735,878	
Early Stage Venture	138		\$2,420,348,007	
Late Stage Venture	28		\$4,050,000,000	
Qtr2	250		\$5,665,836,141	
Seed	80		\$123,797,301	
Early Stage Venture	146		\$3,617,367,245	
Late Stage Venture	24		\$1,924,671,595	
Qtr3	263		\$7,724,333,925	
Seed	68		\$253,613,171	
Early Stage Venture	158		\$4,269,641,189	
Late Stage Venture	37		\$3,201,079,565	
Qtr4	248		\$5,154,761,743	
Seed	68		\$55,232,105	
Early Stage Venture	147		\$1,863,567,848	
Late Stage Venture	33		\$3,235,961,790	
2016	1000	-1.38%	\$38,569,642,056	53.69%
Qtr1	286	13.04%	\$12,419,645,674	89.58%
Seed	68	-21.84%	\$87,930,836	8.91%
Early Stage Venture	195	41.30%	\$10,723,385,982	343.05%
Late Stage Venture	23	-17.86%	\$1,608,328,856	-60.29%
Qtr2	226	-9.60%	\$11,917,640,348	110.34%
Seed	59	-26.25%	\$32,499,317	-73.75%
Early Stage Venture	129	-11.64%	\$8,177,222,019	126.05%
Late Stage Venture	38	58.33%	\$3,707,919,012	92.65%
Qtr3	255	-3.04%	\$7,837,687,433	1.47%
Seed	78	14.71%	\$44,942,015	-82.28%
Early Stage Venture	145	-8.23%	\$4,925,432,192	15.36%
Late Stage Venture	32	-13.51%	\$2,867,313,226	-10.43%
Qtr4	233	-6.05%	\$6,394,668,601	24.05%
Seed	53	-22.06%	\$79,374,901	43.71%
Early Stage Venture	136	-7.48%	\$2,501,871,590	34.25%
Late Stage Venture	44	33.33%	\$3,813,422,110	17.85%
2017	1192	19.20%	\$48,063,037,387	24.61%
Qtr1	271	-5.24%	\$10,276,713,824	-17.25%
Seed	63	-7.35%	\$69,525,852	-20.93%
Early Stage Venture	164	-15.90%	\$4,233,334,089	-60.52%
Late Stage Venture	44	91.30%	\$5,973,853,883	271.43%
Qtr2	248	9.73%	\$7,433,796,810	-37.62%
Seed	40	-32.20%	\$72,377,486	122.70%
Early Stage Venture	168	30.23%	\$3,712,384,957	-54.60%
Late Stage Venture	40	5.26%	\$3,649,034,367	-1.59%
Qtr3	276	8.24%	\$11,767,256,644	50.14%
Seed	51	-34.62%	\$143,068,141	218.34%
Early Stage Venture	176	21.38%	\$7,027,266,421	42.67%
Late Stage Venture	49	53.13%	\$4,596,922,082	60.32%
Qtr4	397	70.39%	\$18,585,270,109	190.64%
Seed	90	69.81%	\$406,132,764	411.66%
Early Stage Venture	262	92.65%	\$8,053,241,243	221.89%
Late Stage Venture	45	2.27%	\$10,125,896,102	165.53%
2018	3034	154.53%	\$83,663,861,916	74.07%
Qtr1	539	98.89%	\$15,620,388,103	52.00%
Seed	110	74.60%	\$255,042,806	266.83%
Early Stage Venture	351	114.02%	\$8,096,785,390	91.26%
Late Stage Venture	78	77.27%	\$7,268,559,907	21.67%
Qtr2	841	239.11%	\$32,200,299,200	333.16%
Seed	286	615.00%	\$285,436,252	294.37%
Early Stage Venture	461	174.40%	\$6,866,295,177	84.96%
Late Stage Venture	94	135.00%	\$25,048,567,771	586.44%
Qtr3	973	252.54%	\$22,349,964,781	89.93%
Seed	412	707.84%	\$1,145,661,240	700.78%
Early Stage Venture	469	166.48%	\$13,171,403,764	87.43%
Late Stage Venture	92	87.76%	\$8,032,899,777	74.75%
Qtr4	681	71.54%	\$13,493,209,832	-27.40%
Seed	268	197.78%	\$548,967,181	35.17%
Early Stage Venture	328	25.19%	\$6,188,491,212	-23.16%

(continued on next page)

Table 1 (continued)

	# of Transactions	% Difference (Transactions)	Investment Raised (in USD)	% Difference (Investment Raised)
Late Stage Venture	85	88.89%	\$6,755,751,439	-33.28%
2019	2215	-26.99%	\$45,171,011,298	-46.01%
Qtr1	596	10.58%	\$12,798,913,826	-18.06%
Seed	226	105.45%	\$383,948,117	50.54%
Early Stage Venture	312	-11.11%	\$6,001,429,324	-25.88%
Late Stage Venture	58	-25.64%	\$6,413,536,385	-11.76%
Qtr2	638	-24.14%	\$9,044,625,128	-71.91%
Seed	248	-13.29%	\$354,248,769	24.11%
Early Stage Venture	333	-27.77%	\$5,523,489,192	-19.56%
Late Stage Venture	57	-39.36%	\$3,166,887,167	-87.36%
Qtr3	619	-36.38%	\$9,458,381,477	-57.68%
Seed	242	-41.26%	\$385,387,146	-66.36%
Early Stage Venture	315	-32.84%	\$4,897,520,846	-62.82%
Late Stage Venture	62	-32.61%	\$4,175,473,485	-48.02%
Qtr4	362	-46.84%	\$13,869,090,867	2.79%
Seed	71	-73.51%	\$125,067,518	-77.22%
Early Stage Venture	224	-31.71%	\$6,503,830,482	5.10%
Late Stage Venture	67	-21.18%	\$7,240,192,867	7.17%
2020	142	-93.59%	\$5,129,576,312	-88.64%
Qtr1	142	-76.17%	\$5,129,576,312	-59.92%
Seed	18	-92.04%	\$52,298,483	-86.38%
Early Stage Venture	94	-69.87%	\$1,345,535,850	-77.58%
Late Stage Venture	30	-48.28%	\$3,731,741,979	-41.81%
Total	8597		\$245,693,144,663	

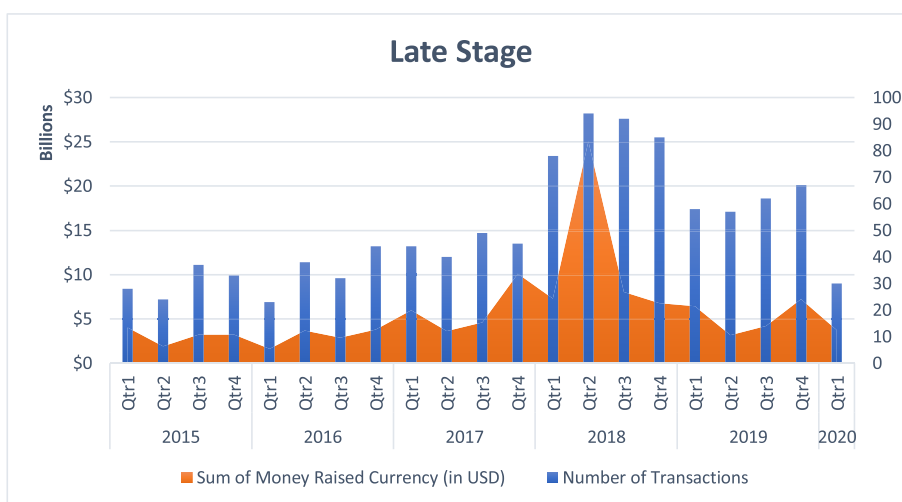


Fig. 1. Late stage equity deals in China, quarter 1 2015- quarter 1 2020.

impact of the crisis on the various stages of funding rounds. The data source enables us to break the different equity funding rounds into three main stages: seed funding (angels, pre-seed and seed), early stage funding (series A and B VC) and late-stage funding (series C-G funds).⁵ Given the nature of the data we are able to see how these funding stages have altered over the last five years right up until the first quarter of 2020 which ended at the end of March 2020. It also enables us to detect the spatial areas in China most heavily impacted.

We can see from Fig. 1, that the largest late-stage VC deals have been heavily impacted by the crisis. These late stage deals often involve considerable prior due diligence and may be slightly more resilient to temporary shocks than earlier stage deals. While these type of deals had been steadily increasing throughout the period 2015–2019, between the final quarter of 2019 and the first quarter of 2020 these deals fell dramatically. As shown in Table 1, investment levels shrunk by 42% between the first quarter of 2019 and the first quarter of 2020. Plus, deal flow almost decreased in half (48%) in the final quarter of 2019 compared to quarter 1 in 2020, with the deal flow and overall value returning to levels last seen in the first quarter of 2015.

Turning our attention to early stage deals, we can see a similar pattern emerging as with the above later stage deals (see Fig. 2 below). These early stage deals had increased markedly over the last five years, albeit in a rather lumpy fashion, peaking in the third quarter of

⁵ “Glossary of Funding Types”, Crunchbase, April 3, 2020, <https://support.crunchbase.com/hc/en-us/articles/115010458467-Glossary-of-Funding-Types>

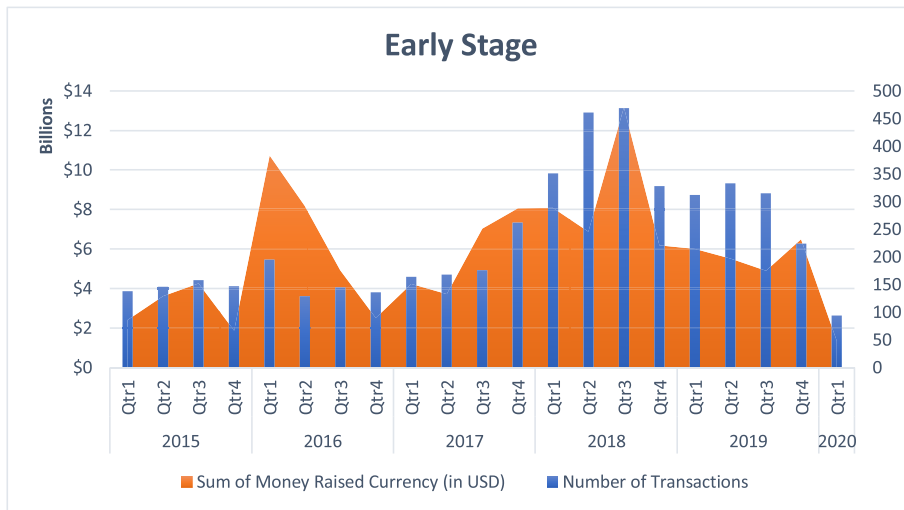


Fig. 2. Early stage equity deals in China, quarter 1 2015- quarter 1 2020.

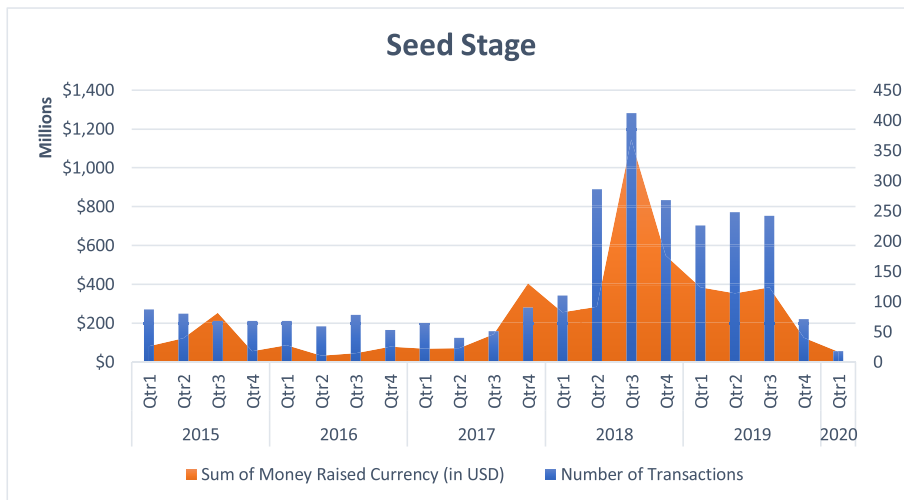


Fig. 3. Seed stage equity deals in China, quarter 1 2015- quarter 1 2020.

2018 (see Table 1). The deal flow of these investments remained quite steady during 2019 until the final quarter when it dropped markedly. Strikingly, between the final quarter of 2019 and the first quarter of 2020, the deal flow fell by two-thirds from 224 to less than 100 deals. As shown in Table 1, investment levels shrunk by 77% between the first quarter of 2019 and the first quarter of 2020. This was also matched by a major reduction in the value of these deals, with investors potentially reducing their level of investments or re-writing the agreed terms between VCs and entrepreneurs. Indeed, there appears some tentative evidence that VCs are using the Covid-19 crisis to undertake this type of opportunistic behaviour.⁶

In contrast to the larger deals outlined in Figs. 1 and 2, the growth of seed stage investments in China over the last five years has been less spectacular (see Fig. 3 below). Innovative start-ups typically receive this form of finance to help them grow. These transactions grew dramatically during 2018 when they almost quadrupled (from just over a 100 to over 400 deals) between the first quarter of 2018 and the third quarter of the same year. Between quarters 1 and 4 of 2019, deal flow fell by two-thirds from 226 to 71. This declining trend became further magnified between the final quarter of 2019 and the first quarter of 2020 at the height of the crisis. Indeed, seed stage deals almost disappeared during the first quarter of 2020 to less than 20 deals in total, representing an 86% year on year reduction, suggesting start-ups could be starved of finance during the crisis.

Given seed stage finance is mainly allocated to the most nascent and informationally opaque types of start-ups/SMEs we would probably have expected to see these types of transactions to be those most heavily impacted by the crisis. Anecdotal evidence suggests

⁶ “Coronavirus will show VCs’ true colours”, Sifted, April 3, 2020, <https://sifted.eu/articles/vc-coronavirus-bad-behaviour/>

Table 2
Number of funding transactions in the first quarter of 2020 compared with 2019.

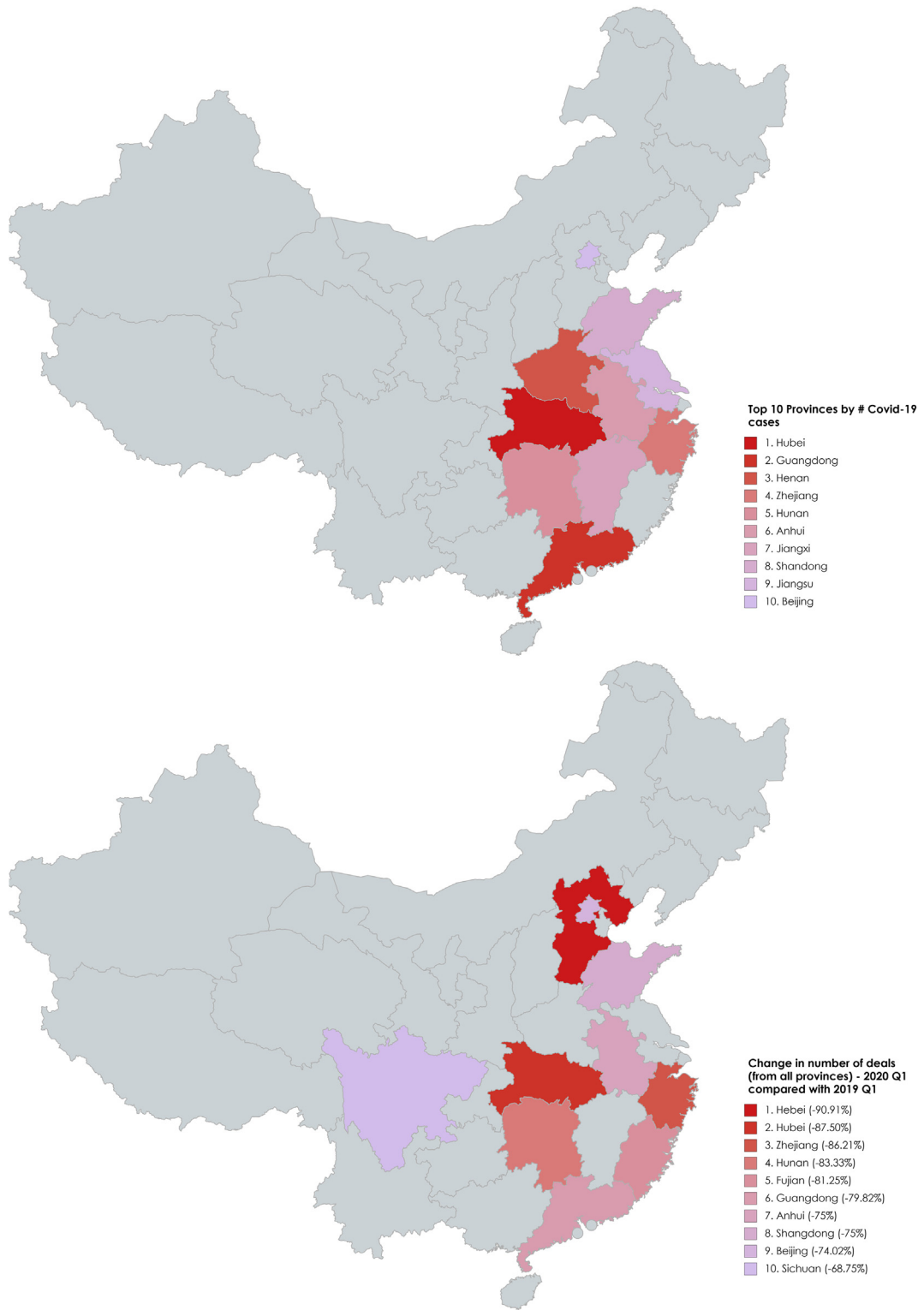
Province/Funding Stage	2019 Q1 transactions	2020 Q1 transactions	% Difference
<i>Anhui</i>	8	2	-75.00%
Seed	4	–	-100.00%
Early Stage Venture	2	1	-50.00%
Late Stage Venture	1	1	0.00%
Venture - Series Unknown	1	–	-100.00%
<i>Beijing</i>	204	53	-74.02%
Seed	73	5	-93.15%
Early Stage Venture	99	33	-66.67%
Late Stage Venture	20	9	-55.00%
Venture - Series Unknown	12	6	-50.00%
<i>Fujian</i>	16	3	-81.25%
Seed	11	1	-90.91%
Early Stage Venture	4	2	-50.00%
Late Stage Venture	1	–	-100.00%
<i>Guangdong</i>	109	22	-79.82%
Seed	40	5	-87.50%
Early Stage Venture	57	12	-78.95%
Late Stage Venture	9	4	-55.56%
Venture - Series Unknown	3	1	-66.67%
<i>Hebei</i>	11	1	-90.91%
Seed	7	–	-100.00%
Early Stage Venture	3	–	-100.00%
Late Stage Venture	1	–	-100.00%
Venture - Series Unknown	–	1	–
<i>Hubei</i>	8	1	-87.50%
Early Stage Venture	8	–	-100.00%
Venture - Series Unknown	–	1	–
<i>Hunan</i>	6	1	-83.33%
Seed	2	–	-100.00%
Early Stage Venture	3	1	-66.67%
Late Stage Venture	1	–	-100.00%
<i>Shandong</i>	8	2	-75.00%
Seed	5	–	-100.00%
Early Stage Venture	3	1	-66.67%
Venture - Series Unknown	–	1	–
<i>Sichuan</i>	16	5	-68.75%
Seed	6	–	-100.00%
Early Stage Venture	8	3	-62.50%
Venture - Series Unknown	2	2	0.00%
<i>Zhejiang</i>	58	8	-86.21%
Seed	18	–	-100.00%
Early Stage Venture	35	5	-85.71%
Late Stage Venture	4	3	-25.00%
Venture - Series Unknown	1	–	-100.00%

that many VCs simply stopped bringing these types of deals to their investment committees in China.⁷ Given some of these deals may necessitate close relational interaction between the investors and the entrepreneurs, anxiety about contracting the virus may explain the dramatic decrease in this category of investment deal during the crisis period. Future work is needed to examine whether this is a short-term impact or a more enduring feature of the risk capital market in China.

Finally, owing to the nature of the data we also examined the spatial impact of the crisis by examining the geographical areas most acutely impacted. Traditionally, entrepreneurial finance is heavily dominated by a few key urban agglomerations in China, especially Beijing, Shanghai and Shenzhen (Pan and Yang, 2019). However, in recent years our data reveals that other Chinese provinces have been able to attract these forms of finance (see Table 2).

The data shows that the province suffering the starkest decrease was the Hebei province, demonstrating that the crisis negatively impacted investment levels across the whole of the country, not just the areas most associated with the outbreak of the virus. However, Fig. 4 clearly shows that several of the provinces where the virus most acutely affected also suffered the heaviest decreases of entrepreneurial finance (i.e. Hubei, Zhejiang and Hunan). The spatial data also shows that the funding stage most acutely affected in these areas was the seed funding round, which reduced by over 90% in many of the top ten provinces for entrepreneurial finance transactions such as Hebei and Beijing (see Table 2).

⁷ "China's start-ups struggle as coronavirus fear hits funding", Financial Times, April 3, 2020 <https://www.ft.com/content/85b95870-591c-11ea-a528-dd0f971febbc>



Data source: China National Health Commission, April 3, 2020 and Crunchbase, April 1, 2020

Fig. 4. Top 10 Chinese Provinces by number of Covid-19 cases (April 3, 2020) and Provinces with highest drops in number of investments received (between 2019 Q1 and 2020 Q1).

4. Conclusion

Since the outbreak of the Covid-19 virus in China there has been a stark and dramatic decrease in aggregate levels of equity investments (i.e. a 60% year on year decrease between quarter 1 in 2019 and quarter 1 in 2020) in China across all stages of the investment process. The severity of this decrease far exceeds the decreases witnessed in more established markets for entrepreneurial finance such as the US (Howell et al., 2020). This decline is also three times the size of decrease detected by scholars following the financial crisis (Block and Sandner, 2009), suggesting that the uncertainty caused by the Covid-19 crisis is likely to considerably surpass the GFC. This impact has been most pronounced for the most nascent entrepreneurial firms (i.e. the most opaque and most in need of close investor-entrepreneur interaction), corroborating a large body of literature inferring that uncertainty has deeply damaging consequences for the most innovative and informationally opaque start-ups and SMEs (Doshi et al., 2018; Howell et al., 2020).

Turning to the wider implications of the study, these data sources also offer scholars opportunities to inform their longer-term research and theoretical development. If entrepreneurs and investors cannot physically meet, interact and converse these deeply network-based, relational and spatially mediated investment processes underpinning entrepreneurial sources of finance may cease to function adequately during a crisis such as a pandemic. It also begs key questions concerning the types of entrepreneurial behaviour deployed by start-ups during a crisis. Entrepreneurial behavioural theories such as bricolage seem obvious candidates to further explore entrepreneurial responses to resource parsimony induced by crisis situations (Baker and Nelson, 2005; Kuckertz et al., 2020), especially given the need for experimental approaches towards financing innovative start-ups (Brown et al., 2018).

These sources of RTD can potentially yield invaluable insights to aid rapid policy responses to tackle these types of quickly unfolding crisis periods with strategically targeted policy interventions. For example, Chinese policy makers could perhaps offer time-bound investment incentives to help address the huge decreases in entrepreneurial finance detected, especially for the seed stage investments in the provinces most acutely impacted. Another approach would be for policy makers to facilitate online engagement between entrepreneurs and investors through secure online meetings places similar to private equity crowdfunding platforms. This novel form of online brokerage could help alleviate the informational problems associated with financial distancing during a crisis such as the Covid-19 crisis.

Added to this, these types of live data sources can enable policy makers to track how entrepreneurial phenomenon (such as entrepreneurial finance) responds during recovery periods following shock events. Therefore, it can enable *real-time policy evaluation* to ascertain how effectively entrepreneurial actors respond to policy measures implemented to address crisis situations. For example, in recognition of the potential negative impact of the Covid-19 crisis is having on British start-ups, the UK government established a Future Fund with a budget of £250 m to provide funding of between £250,000 to £5 m for UK start-ups.⁸ Using these forms of RTD, countries can track the effectiveness of such policy interventions by monitoring future changes in the market for entrepreneurial finance following a crisis period.

Given the magnitude of the chronic uncertainty sweeping the global economy since the outbreak of the Covid-19, further scholarly work is urgently needed to examine how entrepreneurship is being impacted by the pandemic in other spatial contexts. We hope this paper stimulates others to undertake further research on entrepreneurship in times of crisis.

Author contribution statement

Both authors contributed equally to the study. Brown was responsible for primarily framing and synthesis of the work and Rocha was responsible for the data analysis.

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⁸ <https://www.businessinsider.com/uk-250-million-future-fund-explained-2020-4?r=US&IR=T>

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