INTERNATIONAL MONETARY FUND

Riding Unicorns: Startups and Venture Capital in Japan

Salih Fendoglu and TengTeng Xu

WP/24/246

2024
DEC

WORKING PAPER

 WP/24/246

IMF Working Paper
Asia and Pacific Department

Riding Unicorns: Startups and Venture Capital in Japan
Prepared by Salih Fendoglu and TengTeng Xu

Authorized for distribution by Nada Choueiri
December 2024

ABSTRACT: The startup ecosystem in Japan has seen gradual growth, supported by the government's recent "Startup Development Five-Year Plan" and a significant interest from overseas venture capital. This paper lays out the startup financing ecosystem in Japan, with comparison to international peers, and studies potential drivers of startup financing and their relevance for startups' performance. The results, based on country-level aggregate analysis, underscore the critical role of firm dynamism and entrepreneurship in supporting capital investment and firm valuations. Further analyses at the firm level suggest that equity funding helps startups innovate, grow, and successfully exit. Moreover, the impact of funding on the likelihood of a successful exit appears to be higher in cultures that seem to reward risk taking.

JEL Classification Numbers:	G24; O30; O38; C33
Keywords:	Startups; venture capital; Japan; firm dynamics.

Author's E-Mail Address:	sfendoglu@imf.org; txu@imf.org

WORKING PAPERS

Riding Unicorns: Startups and Venture Capital in Japan

Prepared by Salih Fendoglu and TengTeng Xu[1]

[1] "The author(s) would like to thank Kaustubh Chahande for excellent research assistance. We appreciate useful comments from Yan Carriere-Swallow, Ranil Salgado, Junji Ueda, and seminar participants at the Ministry of Finance of Japan.

Contents

I. Introduction

Startups play a crucial role in driving innovation and economic growth by creating new markets, products, and technologies. Funding for startups, particularly through venture capital (VC) and angel investors, is vital as it provides the necessary financial resources and expertise to nurture and scale these nascent enterprises (Puri and Zarutskie, 2012; Bernstein, Giroud, and Townsend, 2016; Akcigit and others, 2022). Countries face several key issues in supporting startups, including ensuring access to early-stage funding, developing supportive regulatory environments, and fostering a culture that tolerates risk. Addressing these challenges involves not only financial support but also cultural and structural reforms to create a conducive ecosystem for startups to thrive.

To this effect, the Japanese government has recently boosted its support for startups and venture capital funding through a comprehensive plan, "Startup Development Five-Year Plan". On the funding side, the plan aims to increase the scale of investment in startups by 10-fold by 2027. Furthermore, it aims to support building human capital and startup networks, enhancing funding and diversifying exit options, and in turn, promoting innovation. These initiatives came against the backdrop of a growing but relatively small startup ecosystem compared with peer countries.

This paper examines potential factors that support startups and venture capital funding using a novel cross-country database on startups, with a focus on Japan. First, we lay out the key characteristics of startups and their funding in Japan and compares them with other leading countries for startups. Second, we conduct two sets of empirical analyses, using detailed data on startups and funding from PitchBook, one of the most comprehensive databases on private markets globally. We start by examining how structural factors such as firm dynamism (entry and exit) and entrepreneurship affect capital investment and firm valuations, using a cross-country database for 30 large advanced and emerging market economies. We then conduct firm-level analysis on how equity funding, including through venture capital, determines startups' performance and innovation, and whether cultural traits play a role in the exit of startup. To address the potential identification challenge—a selection bias due to investors striving to choose most productive firms at the first place, we first match firms based on observables other than funding (e.g., age, employment, industry) and then use an endogenous treatment model to account for the possibility that startups' quality may drive both the availability of funding and their subsequent performance.

The results suggest that a higher share of entrepreneurship and better firm dynamism are associated with higher capital investment and greater firm valuations at the country level. At the firm level, well-funded startups (particularly through equity funding) have a higher number of total patent documents, tend to be larger, and have higher exit probabilities (via initial public offering (IPO) or merger and acquisition (M&A)). Moreover, the impact of funding on the likelihood of a successful exit appears to be higher in cultures that seem to tolerate risk taking.

Our analysis is related to two main strands of literature. First, several papers have examined qualitatively the importance of startups and venture capital funding in driving innovation, in Japan and elsewhere. For example, Itai and others (2024) discusses the environment for startups and initiatives in Tokyo, where most startups are located, and in other regions. Arnold, Claveres, and Frie (2024) explored the importance of venture capital and the state of innovation financing ecosystem in the European Union. Second, our analysis is related to the empirical literature on the impact of early-stage funding on startups' performance. For example, Kerr and others (2014) and Akcigit and others (2022) examine how angel or venture capital investors select startups to provide funding and find that VC-backing increases a startup's likelihood of reaching the right tails of the firm size and innovation distributions. Puri and Zarutskie (2012) find that VC-financed firms grow larger than non-VC-financed firms, as measured by employment and sales, thereby achieving larger scale. Greenwood and others (2022) highlight the essential role of VC financing for US innovation and growth.

This paper contributes to the literature on startups and venture capital in three dimensions. First, we examine the key features of the startup ecosystem in Japan using a novel database (PitchBook), by industry, investor type and the stage of funding. Second, we analyze how structural factors such as entrepreneurship and firm dynamism affect capital investment and valuation of firms using cross-country regressions. Third, in addition to looking into the impact of venture capital funding on startups' performance and innovation, we shed light on the potential role of entrepreneurial culture.

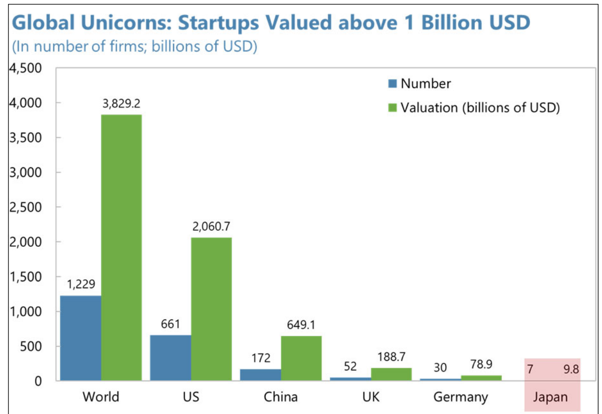
The rest of the paper proceeds as follows. In Section II, we provide stylized facts of the startup ecosystem in Japan, including that for startup funding. In Section III, we explain the construction of the cross-country datasets and the empirical methodology at both country and firm levels. In Section IV, we present the empirical results and key findings on the structural factors that influence capital investment and valuations of firms, and the role of equity funding in driving firms' innovation, growth, and exit. Finally, we offer some concluding remarks in Section V.

II. The Ecosystem of Startups in Japan

Japan's startup ecosystem has grown gradually in recent years, with over 10,000 startups. However, they tend to be smaller compared with those in the United States (U.S.), China, and the United Kingdom (U.K.), with a relatively lower number of unicorns with valuation above US$1 billion[1]

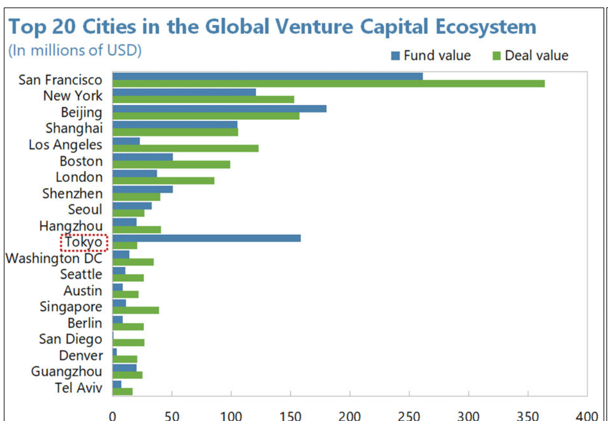
[1] The number of unicorns in Japan stood at 7 in 2023, compared with 653 in the U.S. Similarly, the valuation of unicorns in Japan was about US$9.8 billion in 2023, compared with US$2 trillion in the U.S. See CB Insights, "The Complete List of Unicorn Companies".

(representing just 0.5% of the global total). The Total Early-Stage Entrepreneurial Activity (TEA) Index, as of 2022, highlights Japan's lag in entrepreneurial activity among peer countries, with a score of 6.4 compared to the U.S.'s 19.2, U.K's 12.9, or South Korea's 14.9.

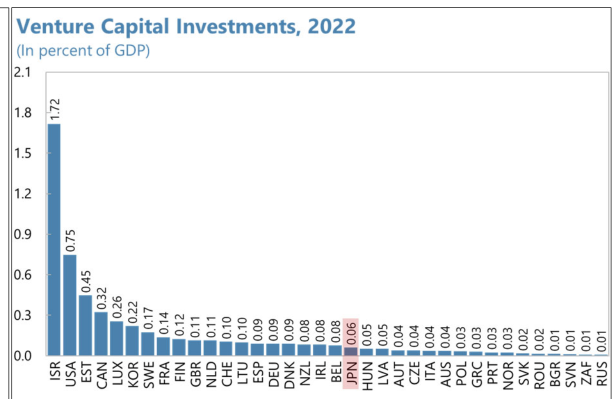


Note: Data as of October 19th, 2023. Source: CB Insights.

Japan's venture capital equity funding remains relatively small as a share of GDP compared with peers, e.g., about one tenth of that of the US. This said, Tokyo, being among the top 20 cities in the global VC ecosystem, emerges as a global VC hub, based on rankings by PitchBook.[2] Tokyo ranks as third in terms of fund value, and relatively high in terms of deal value. Funding for startups tends to concentrate in the Tokyo metro area, accounting for about 80% of total funding in Japan.



Source: PitchBook Data, Inc., *Global VC Ecosystem Rankings*, Oct 10, 2023.



Source: OECD, *Venture Capital Investments* Database.
Note: Data for JPN, ISR, & ZAF as of 2021; data for AUS, & RUS as of 2019.

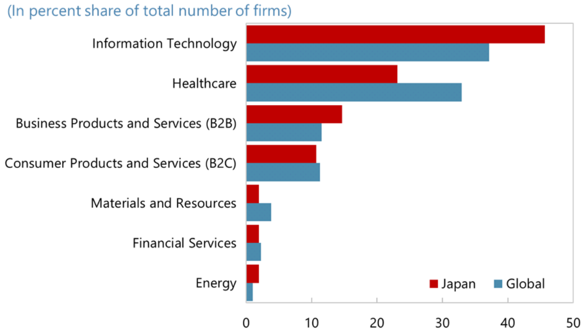
The government continues to support startups and venture capital funding through the "Startup Development Five-Year Plan". The plan focuses on three main pillars: 1) building human resources and networks for creating startups; 2) strengthening funding for startups and diversifying exit strategies; and 3) promoting open innovation. The authorities have set up entrepreneur development hubs overseas and promoted startup incubators in central Tokyo, with close collaborations with universities. On financing, the Japan Investment Corporation launched a 200-billion-yen venture growth fund in 2023 to support later stage startups to create unicorns and to target early-stage startups beyond deep tech and life sciences.

The industrial composition of startups in Japan is broadly similar to that in global peers. Based on firm-level data, most startups operate in the information technology (IT) sector, followed by health

[2] See PitchBook (2023a), "Global VC Ecosystem Rankings".

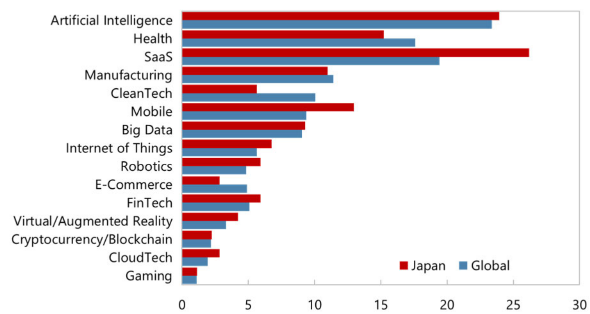
care, and business products and services (B2B). Using an alternative industry classification—“vertical” that spans various sectors—we reach a similar conclusion that the industrial composition of startups in Japan is similar to global peers. Some subtle differences are that the share of startups in IT or SaaS (Software-as-a-Service) appears somewhat higher in Japan than the global average, while the share of clean technology-related startups seem to be lower compared to the global sample.

Composition of Firms Across Industries
(In percent share of total number of firms)



Sources: PitchBook Data, Inc. and IMF staff calculations. Note: Global sample includes AUS, CAN, FRA, DEU, IND, ITA, JPN, KOR, SGP, ESP, SWE, GBR, and USA, and reflects filtering of firms as discussed in the text. Data accessed on Dec 22, 2023.

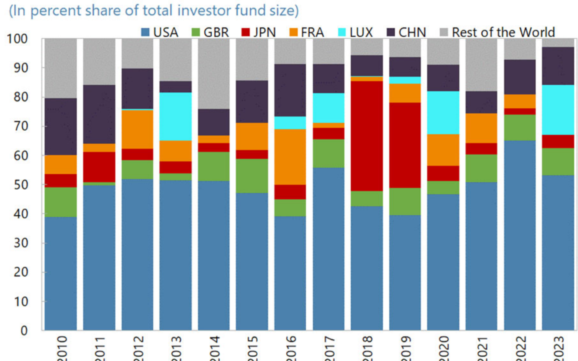
Composition of Firms Across Verticals
(In percent share of total number of firms)



Sources: PitchBook Data, Inc. and IMF staff calculations. Note: Global sample includes AUS, CAN, FRA, DEU, IND, ITA, JPN, KOR, SGP, ESP, SWE, GBR, and USA, and reflects filtering of firms as discussed in the text. Data accessed on Dec 22, 2023.

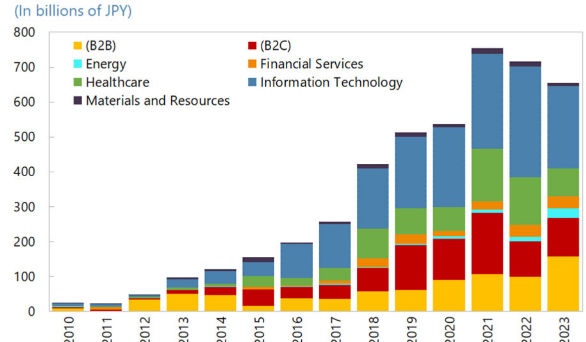
Most investors in Japan’s startups are from overseas. U.S. investors account for the major share in Japan’s startups, with their share at about 50 percent between 2010 and 2023. U.K. investors account for about 10 percent, while Japanese investors saw their share declining to about 5 percent in recent years. By sector, most of the capital is invested in startups in IT and health care, in which Japan has a comparative advantage. More recently, there has been a rise in capital invested in startups that focused on business products and services B2B and Business-to-consumer (B2C) industries.

Leading Origins of Investors in Japanese Startups by Size
(In percent share of total investor fund size)



Source: PitchBook Data, Inc. Note: Data accessed on Dec 22, 2023.

Capital Invested in Startups in Japan by Primary Industry
(In billions of JPY)



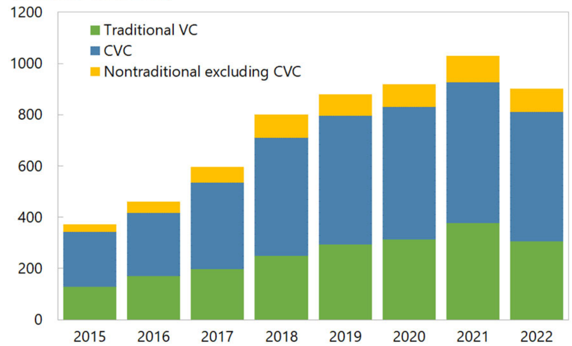
Source: PitchBook Data, Inc. Note: The deals included are Equity for Service, Grants and Equity and Product Crowdfunding, Pre/Seed, Early and Later Stage VC deals. Data accessed on Dec 22, 2023.

An interesting aspect of VCs in Japan is the prevalence of corporate VCs or CVCs. Large Japanese corporations play in important role in funding startups through CVCs, utilizing their sizable stock of cash holdings. Between 2015 and 2022, Japanese CVCs invested in at least half of all VC deals in

Japan, peaking at 62 percent in 2020.[3] In terms of the stage of funding, most of the deals are in seed and early-stage VC, which may explain the relatively small size of Japanese startups. However, the share of funding for later-stage VC has increased in recent years.

Active Investors in Japan by Type

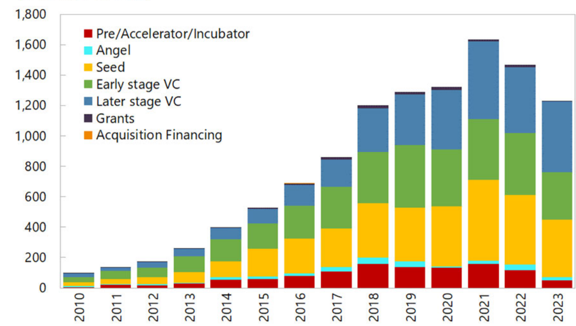
(In number of investors)



Source: PitchBook Data, Inc., *The State of CVCs in Japan*. Note: Data as of Dec 31, 2022.

Japanese Start-up Deals by Funding Stage

(In number of deals)



Source: PitchBook Data, Inc. Note: The deals included are Equity for Service, Grants and Equity and Product Crowdfunding, Pre/Seed, Early and Later Stage VC deals. Data accessed on Dec 22, 2023.

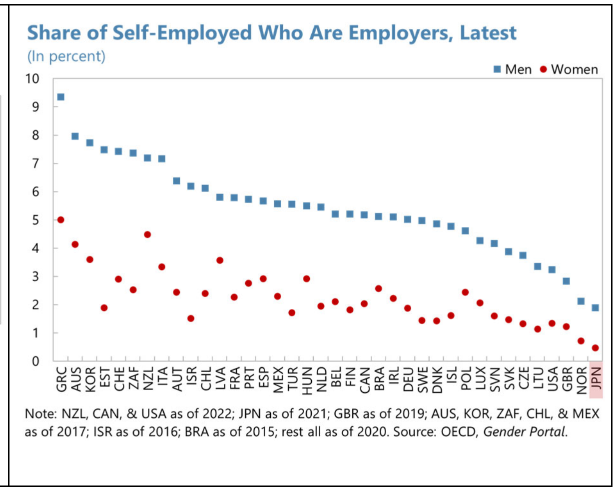
III. Data and Methodology

A. Aggregate Country-Level Analysis

We construct a cross-country aggregate database for 30 large advanced and emerging market economies, spanning years from 2000 to 2022. On firm performance, we utilize PitchBook, which contains detailed information on capital investment and firm valuations.

On macro and structural variables, we include GDP growth, inflation, and proxies for firm dynamism and entrepreneurship. Firm dynamism is proxied by firm entry and exit rates, and entrepreneurship by the share of self-employed who are employers. As documented below, Japan has a relatively low exit rate and a low share of self-employed (who are employers) compared with other OECD countries.

[3] See PitchBook (2023b), "The State of CVCs in Japan".



The key question in our empirical analysis at the aggregate level is how country-specific macro and structural conditions affect the outcome for firms. We estimate panel regressions with capital investment and valuations as dependent variables, and country-specific macro and structural variables as independent variables.

The panel regressions are estimated with the Arellano-Bover/Blundell-Bond linear dynamic panel data estimator with robust standard errors, specified as follows:

$$Y_{kt} = \alpha + \vartheta_k + \delta Y_{k,t-1} + \phi' X_{k,t-1} + \varepsilon_{kt}, \quad (1)$$

where Y_{kt} captures capital invested (mean) in firms or valuation (mean) of firms (millions of U.S. dollars) in country *k* at time *t*. X_{kt} captures country-specific macro and structural variables, including real GDP growth, inflation, entrepreneurship, exit rate, entry rate, and average job tenure.

B. Firm-Level Analysis

We limit the firm-level sample to startups, defined for the analyses as companies that are young (less than 10 years old) and backed by any early-stage funding (venture capital, accelerator/incubator, or angel) at least once over its life cycle.[4] We further focus on those with non-missing information on several key characteristics that are used in the empirical model discussed below. The final sample includes startups from 13 countries for which the coverage (number) of startups is the largest, namely, Australia, Canada, France, Germany, India, Italy, Japan, Korea, Singapore, Spain, Sweden, the U.K, and the U.S. The majority of start-ups in the final sample appears to be from the U.S., followed by the U.K.[5] The data is cross-sectional and as of end-2023.

[4] Startup as a term does not have a precise definition. Britannica defines a startup company as a young firm typically characterized by "innovative stance, potential for rapid growth, external funding, and vulnerability" (Britannica). Average time to exit for a start-up differs across industries and potentially across countries. For the US, it ranges from a few years to more than 10 years (Crunchbase, 2024).

[5] As will be evident below, we exploit within country-industry variation in the empirical model that in part mitigates potential bias in the estimates due to any difference in the composition of country or industry in the filtered compared to raw data. Note also that the results are robust to excluding the US from the sample (see 2024 Japan AIV Selected Issues Papers).

It is empirically challenging to properly measure the impact of early-stage funding on startups' subsequent performance. This is mainly because angel or venture capital investors select firms that they assess to have the greatest potential to grow, as they seek to maximize returns (see, for example, Kerr and others, 2014, about the detailed screening process used by angel investors in California). This identification challenge is well-known in the literature (see, for example, Kerr and others, 2014; Puri and Zarutskie, 2012; Akcigit and others, 2022; and references therein). Here, we follow a similar approach as the previous literature by first matching firms based on observables other than funding (e.g., age, employment, industry). We then use a standard endogenous treatment model to take into account the possibility that startups' quality may drive both the availability of funding and their subsequent performance.

The estimation equation is as follows:

$$Outcome_i = \beta X_i + \delta WellFunded_i + \varphi_{country,sector} + \epsilon_i \qquad (2)$$

where $Outcome_i$ is a set of performance indicators of startup *i*: log of total patent documents, log of number of employees, and the exit probability.[6] $WellFunded_i$ is a dummy variable that takes a value 1 if total capital raised per employee by startup *i* is above the country-industry median, and 0 otherwise.[7] X_i denote the set of firm controls, in particular firm age and number of employees.[8] $\varphi_{country,sector}$ are country-sector fixed effects, which help to identify within country-industry variation. Standard errors are clustered at the country level. Note that there is no time dimension, as we have cross-sectional information.

The availability of funding, $WellFunded_i$, is treated as endogenous in the estimation. As noted above, we would like to account for the fact that unobservables, for example, entrepreneurial ability or ambition, could drive both the outcome and the availability of funding, i.e., by how much investors would be interested in investing in the startup. To this effect, we assume that $WellFunded_i$ depends on the number of active investors in startup *i*, as a proxy for how promising the startup is in the spirit of Kerr and others (2014). $WellFunded_i$ is assumed to depend also on the number of years since the first and last fund raising due to the fact that we are able to observe only a snapshot of firms at a given time (end-2023) and there could be differences across firms in the time that has passed since funding. The procedure allows error terms in equation (2) to be correlated with the auxiliary regression that links $WellFunded_i$ to its determinants:

[6] The available firm-level data does not include information about firm exits (e.g., whether or when a firm exited and in what form), and in effect, is available for only non-exited firms as of end-2023. To be able to reflect on the potential impact of the availability of funding on the likelihood that a startup exits successfully, we use the probability of exit (via IPO or M&A) reported by PitchBook. PitchBook uses proprietary data and uses machine learning techniques to estimate the probability of exit (via IPO or M&A) for each individual firm.

[7] The results are broadly robust to choosing different thresholds, e.g., choosing startups with total capital raised per employee above the 75th percentile of the country-industry as "well-funded" and those below the 25th percentile as not "well-funded" do not affect the results materially, though the sample size drops notably.

[8] For the specification that has the number of employees as the outcome variable, number of employees is dropped from the set of control variables X_i.

$$WellFunded_i = \beta Z_i + u_i, \quad (3)$$

where Z_i denote (i) total number of active investors, (ii) years since the first funding, and (iii) years since the last funding, for startup *i*, and the test statistic for the null hypothesis, cov(ϵ_i, u_i) = 0 has a χ^2 distribution. In the below, we report the p-value associated with this null hypothesis across different specifications.

The key hypothesis is that funding has a positive impact on the outcomes for startups ($\delta > 0$). That is, we study whether startups that have total capital raised per employee above the country-industry median perform better than the startups that are less funded. Due to data limitations, we are not able to take a particular funding round as the starting point and track the evolution of the performance of funded and non-funded startups, as done in the related literature (see, for example, Akcigit and others, 2022). That said, by focusing on startups that receive at least some funding, we are in principle able to reduce potential differences across the "treated" (well-funded) and "control" (not well-funded) set of firms. Moreover, to further reduce potential differences across firms, we employ coarsened exact matching (Iacus and others, 2012; Blackwell and others, 2009). In particular, we match each well-funded startup with a non-well-funded startup in the same country and industry that has the same age and number of employees.[9]

Table 1 presents the summary statistics of the variables. $WellFunded_i$ has, by construction, a mean of about 0.50. A median start-up has 7 total (active or pending) patent documents, 23 employees and is 6 years old. The sample includes very young or relatively small start-ups as well (with age and number of employees attaining a minimum of 1 in the sample). The sample of Japanese startups share similar characteristics regarding these observables, except they seem to be relatively smaller (e.g., 15 vs 23 employees at the median, or 38 vs 48 at the 3rd quartile).

[9] Two-sided t-test of means for treated and control samples imply (i) for age, a p-value of 0.05 before matching and 1.00 after the matching; (ii) for total number of employees, a p-value of 0.003 before matching and 0.42 after matching. Matching drops 13 percent of the firms in the final sample.

Table 1. Summary Statistics

		Mean	Std.Dev	Minimum	25th percentile	Median	75th percentile	Max	N
Global Sample	Well-Funded	0.50	0.50	0.00	0.00	1.00	1.00	1.00	4422
	Total Patent Documents, log	2.08	1.08	0.00	1.39	1.95	2.83	5.69	4422
	Total Number of Employees, log	3.15	1.11	0.00	2.30	3.14	3.87	6.80	4422
	Age, in years, log	1.72	0.34	0.00	1.61	1.79	1.95	2.08	4422
	Active Number of Investors	9.83	8.89	1.00	4.00	8.00	13.00	181	4422
	Years since first financing round	4.80	1.83	0.00	3.00	5.00	6.00	8.00	4422
	Years since last financing round	0.87	1.10	0.00	0.00	1.00	1.00	5.00	4422
	Uncertainty Avoidance Index	0.55	0.18	0.29	0.46	0.46	0.48	0.92	3628
	Power Distance Index	0.45	0.10	0.31	0.40	0.40	0.40	0.77	3628
Japan	Well-Funded	0.51	0.50	0.00	0.00	1.00	1.00	1.00	307
	Total Patent Documents, log	1.74	1.27	0.00	0.69	1.79	2.64	4.89	307
	Total Number of Employees, log	2.89	1.08	0.69	2.08	2.71	3.64	6.21	307
	Age, in years, log	1.72	0.34	0.69	1.61	1.79	1.95	2.08	307
	Active Number of Investors	9.96	6.94	1.00	5.00	8.00	13.00	43.00	307
	Years since first financing round	4.64	1.76	1.00	3.00	5.00	6.00	8.00	307
	Years since last financing round	1.10	1.12	0.00	0.00	1.00	2.00	5.00	307

IV. Empirical Results

A. Aggregate Country-Level Analysis

At the aggregate cross-country level, the results highlight the importance of firm dynamism and entrepreneurship in supporting capital investment and valuations in firms. We find that a higher share of entrepreneurship (proxied by the share of self-employed who are employers) is associated with higher *capital investment* in firms in a country (Table 2). Given the lifetime employment system is many firms in Japan, the share of entrepreneurship tends to be lower compared with other OECD countries. However, higher entrepreneurship is often associated with higher risk taking and therefore greater capital investment. Similarly, a higher share of entrepreneurship is associated with higher *valuation* of firms at the country level (Table 3).

In addition, better firm dynamism as depicted by higher entry and exit rates are associated with greater valuation and higher capital investment. Entry and exit rates in Japan tend to be lower compared with other countries (for example, Caballero, Hoshi, and Kashyap, 2008 and Goto and Wilbur, 2019), in part, reflecting the presence of zombie firms that distorted the efficient allocation of resources and discouraged the entry of more productive firms (Hong and others, 2020). More dynamic entry and exit of firms are associated with higher investment and valuation, possibly driven a more efficient allocation of resources and higher productivity of firms.

Table 2. Cross Country: Capital Investment and Structural Characteristics

	Dependent variable: capital invested (mean)				
Capital invested (lagged)	-0.0399	**0.0803****	0.00502	0.0144	**0.103*****
	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)
Real GDP growth (lagged)	**2.971***	1.213	1.84	-0.806	-0.84
	(1.55)	(2.30)	(1.20)	(1.22)	(1.67)
Inflation (lagged)	5.828	1.729	4.605	2.663	-1.688
	(5.92)	(2.99)	(4.26)	(3.11)	(1.74)
Enterpreneurship (lagged)	**17.37*****	**15.40*****			
	(3.98)	(5.94)			
Exit rate (lagged)	5.996		4.595		
	(5.23)		(3.91)		
Entry rate (lagged)				**9.061***	
				(5.28)	
Average job tenure (lagged)					-30.86
					(25.25)
Constant	-154.1***	-100.4	71.33***	16.48	432.2*
	(54.54)	(82.77)	(23.69)	(41.25)	(254.40)
Observations	170	501	214	334	418

Note: The table represents panel regression results based on equation (1), estimated with the Arellano-Bover/Blundell-Bond linear dynamic panel data estimator with robust standard errors (in parenthesis). ***,**,* denote statistical significance at 1, 5, and 10 percent, respectively.

Table 3. Cross-Country: Valuations and Structural Characteristics

	Dependent variable: valuation (mean)				
Valuation (lagged)	-0.013	**0.0883***	0.0236	-0.00293	**0.101*****
	(0.02)	(0.05)	(0.05)	(0.02)	(0.04)
Real GDP growth (lagged)	5.479	4.218	3.148	-0.335	3.363
	(5.60)	(5.20)	(4.56)	(3.22)	(5.43)
Inflation (lagged)	6.924	-2.6	14.33	11.02	0.402
	(10.86)	(7.61)	(10.39)	(10.41)	(4.87)
Enterpreneurship (lagged)	**32.44***	12.73			
	(17.12)	(24.95)			
Exit rate (lagged)	17.12		**18.35***		
	(12.84)		(9.78)		
Entry rate (lagged)				**5.619***	
				(3.09)	
Average job tenure (lagged)					-40.24
					(47.13)
Constant	-256.4	111.8	**135.9****	**195.1*****	670
	(215.80)	(358.80)	(67.36)	(45.60)	(459.30)
Observations	170	501	214	334	418

Note: The table represents panel regression results based on equation (1), estimated with the Arellano-Bover/Blundell-Bond linear dynamic panel data estimator with robust standard errors (in parenthesis). ***,**,* denote statistical significance at 1, 5, and 10 percent, respectively.

B. Firm-Level Analysis

At the firm level, the empirical results suggest that the availability of funding can improve startups' performance (Tables 4 and 5). Based on the global sample, we find that well-funded startups have a higher number of total patent documents, are larger, and have higher exit probabilities (via initial public offering (IPO) or merger and acquisition (M&A)) (Table 4). The results are not only statistically significant but also economically relevant. For instance, well-funded startups are predicted to have 1.5 times more employees and exit with 43 percentage points higher probability, compared to non-well-funded startups.

The results also confirm potential endogeneity of well-fundedness, where the p-value of the null hypothesis of uncorrelated errors terms in the main and auxiliary regressions is strongly rejected in the majority of the specifications (the p-value of the χ^2 statistic reported in the last row of the upper panel of Table 4). Moreover, as documented in the lower panel, the number of active investors is statistically significant in predicting whether or not a startup is well-funded.

These results hold qualitatively for the sample focusing only on Japan (Table 5). For the Japan sample, the impact of availability of funding on the number of patents seems larger and is more precisely estimated, while the estimated impact on other outcome variables does not seem to be materially different.

We next explore whether cross-country differences in risk-taking culture also matters (Table 6). To this end, we augment the main empirical model by:

$$Outcome_i = \beta X_i + \delta WellFunded_i x Y_{country} + \varphi_{country,sector} + \epsilon_i, \qquad (4)$$

where $Y_{country}$ denotes a set of country-level variables reflecting proxies for cultural differences as measured by Hofstede (2013), namely (i) uncertainty avoidance, reflecting a society's tolerance for uncertainty and ambiguity; and (ii) power distance, reflecting how much a society delegates power to a person of authority and expect and accept that the power is distributed unequally. We hypothesize a greater positive impact of the availability of funding on startup performance in countries that reward risk-taking behavior.

The results suggest that risk-taking culture indeed matters. In particular, the predicted impact of the availability of funding on the exit of a startup is higher in countries with less uncertainty avoidance (for IPO exit) and with less power distance (for M&A exit).

The results should be read with the following caveats, in large part due to data limitations. First, we were not able to track startups' performance following funding rounds, given that the data is cross-sectional. Second, we study a particular vintage of the data, i.e., end-2023, that includes surviving startups. The data for firms that had exited before end-2023 is not available, hence there remains a survivor bias –though it is not evident if the bias would be in a particular direction. Third, we study the impact of the availability of funding, and do not explore to what extent the cost or the conditionality of funding or the particular type of investors would matter, similarly due to data limitations. Moreover, the estimated impacts are identified within country-industry, mainly to sharpen the identification, but this comes at the expense of overlooking potential variation across countries and/or industries. Finally, the analysis does not shed light on whether private equity funding is a complement or substitute to other types of financing (for example, debt financing). This said, exploiting country-industry variation in the identification strategy in part mitigates potential bias due to omitting other potential sources of funding.

Table 4. Global: Does Availability of Funding Affect Startup Performance?

	Dependent Variable				
	log(patent docs)	log(# employees)	exit	IPO	MA
Well-Funded	0.423*	1.784***	45.195***	16.877***	44.265***
	(0.248)	(0.147)	(1.133)	(2.162)	(2.237)
log (# employees)	0.176***		12.654***	6.619***	6.864***
	(0.006)		(0.406)	(0.657)	(0.227)
log(age)	0.674***	0.183***	-9.324***	-1.824***	-8.611***
	(0.023)	(0.052)	(0.858)	(0.503)	(0.610)
Observations	4,428	4,428	4,428	4,428	4,428
chi2 - p-value (rho=0)	0.896	0	0	0	0

	Treatment Variable = Well-Funded				
	log(patent docs)	log(# employees)	exit	IPO	MA
# Active Investors	0.017***	0.033***	0.019***	0.020***	0.014***
	(0.003)	(0.005)	(0.003)	(0.004)	(0.003)
Years since first funding	0.031**	0.032***	0.036***	0.023**	0.036***
	(0.014)	(0.008)	(0.006)	(0.010)	(0.006)
Years since last funding	-0.075***	-0.078***	-0.282***	-0.074***	-0.239***
	(0.025)	(0.022)	(0.032)	(0.026)	(0.026)
Observations	4,428	4,428	4,428	4,428	4,428

Notes: The table presents the endogenous treatment model estimates of equation (2), based on the global sample. For the coverage of "global sample" and the definition of "Well-Funded", see the text. Each column includes country-sector fixed effects. Standard errors are clustered at the country level and provided under parentheses. ***,**,* denote statistical significance at 1, 5, and 10 percent, respectively.

Table 5. Japan: Does Availability of Funding Affect Startup Performance?

	Dependent Variable				
	log(patent docs)	log(# employees)	exit	IPO	MA
Well-Funded	3.453***	0.869***	51.415***	22.804***	45.756***
	(0.298)	(0.177)	(3.156)	(2.208)	(5.211)
log (# employees)	0.098		11.495***	4.641***	7.054***
	(0.078)		(1.115)	(0.855)	(1.174)
log(age)	0.764***	0.541***	-4.742	1.576	-8.338**
	(0.216)	(0.144)	(3.636)	(2.130)	(3.390)
Observations	307	307	307	307	307
chi2 - p-value (rho=0)	0	0	0	0	0

	Treatment Variable = Well-Funded				
	log(patent docs)	log(# employees)	exit	IPO	MA
# Active Investors	0.001	0.057***	0.020**	0.013	0.013
	(0.007)	(0.009)	(0.009)	(0.010)	(0.012)
Years since first funding	-0.024	0.030	0.059*	0.079**	0.044
	(0.028)	(0.039)	(0.032)	(0.037)	(0.038)
Years since last funding	-0.072*	-0.108**	-0.404***	-0.223***	-0.282***
	(0.041)	(0.052)	(0.047)	(0.049)	(0.058)
Observations	307	307	307	307	307

Notes: The table presents the endogenous treatment model estimates of equation (2), based on the Japan sample. Each column includes country-sector fixed effects. Standard errors are clustered at the country level and provided under parentheses. ***,**,* denote statistical significance at 1, 5, and 10 percent, respectively.

Table 6. Global: Does Risk Culture Matter for Startup Exit?

	Dependent Variable: Successful Exit	
Country Characteristic:	Uncertainty Avoidance	Power Distance
Well-Funded	48.057***	48.248***
	(0.534)	(0.553)
Well-Funded * Country Characteristic	-3.602***	-4.271***
	(1.159)	(1.255)
log (# employees)	12.946***	12.922***
	(0.488)	(0.506)
log(age)	-6.355***	-6.370***
	(0.296)	(0.272)
Observations	4,428	4,428
chi2 - p-value (rho=0)	0	0
	Dependent Variable: IPO Exit	
Country Characteristic:	Uncertainty Avoidance	Power Distance
Well-Funded	12.759*	12.719**
	(6.711)	(5.644)
Well-Funded * Country Characteristic	-4.212***	-4.018***
	(1.310)	(1.455)
log (# employees)	5.973***	5.963***
	(0.776)	(0.738)
log(age)	-6.204***	-6.198***
	(0.711)	(0.796)
Observations	4,428	4,428
chi2 - p-value (rho=0)	0.795	0.750
	Dependent Variable: MA Exit	
Country Characteristic:	Uncertainty Avoidance	Power Distance
Well-Funded	47.380***	47.756***
	(1.892)	(1.568)
Well-Funded * Country Characteristic	-1.844	-2.751
	(1.635)	(1.761)
log (# employees)	7.572***	7.547***
	(0.167)	(0.168)
log(age)	-2.964***	-3.014***
	(0.482)	(0.508)
Observations	4,428	4,428
chi2 - p-value (rho=0)	0	0

Notes: The table presents the endogenous treatment model estimates of equation (4). Each column includes country-sector fixed effects. Standard errors are clustered at the country level and provided under parentheses. ***,**,* denote statistical significance at 1, 5, and 10 percent, respectively.

V. Conclusion

This paper examines potential factors that support startups and venture capital funding using a novel cross-country database on startups, with a focus on Japan. We examine how structural factors affect capital investment and valuations in firms more broadly in an aggregate cross-country panel data analysis. We also conduct firm-level analysis on how equity funding, including through venture capital, determines startups' performance and innovation, and whether cultural traits play a role in startup exits.

In line with international experience, our results highlight the importance of equity funding in supporting startups to grow and eventually exit in Japan. Better access to equity funding is crucial for startups to grow, innovate, and exit successfully. Angel or venture capital investment not only provides startups with private equity financing when they do not have access to capital markets, bank loans, or other debt instruments at the early stage of their businesses, but also offers value-added services (for example, operational and market insights).

A more flexible labor market is crucial for entrepreneurship and innovation. A gradual shift away from the lifelong employment system in Japan could encourage talented individuals to consider setting up startups and to have a second chance in case they fail. Reducing labor-market dualism, encouraging merit-based promotions, and facilitating more job mobility can also encourage entrepreneurship, which is associated with higher capital investment and firm valuations at the country level.

Greater firm dynamism can help support startups and innovation. Dynamic firm entry and exit and reduced personal liabilities can also encourage entrepreneurship, innovation, and more efficient allocation of resources. For example, a gradual reduction of zombie firms could help improve the allocation of capital and labor to more productive ventures, boosting productivity and growth.

References

Akcigit, U., Dinlersoz, E., Greenwood, J., and Penciakova, V. 2022. “Synergizing Ventures”, *Journal of Economic Dynamics and Control* 143 (104427), 1-31.

Arnold, N., Claveres, G., and J. Frie, 2024. “Stepping up venture capital to finance innovation in Europe”, IMF Working Paper WP/24/146.

Bernstein, S., Giroud, X., Townsend, R.R., 2016. “The Impact of Venture Capital Monitoring”, *Journal of Finance* 71, 1591-1622.

Blackwell, M., Iacus, S., King, G., and G. Perro. 2009. “cem: Coarsened Exact Matching in Stata”, *Stata Journal* 9(4), 524-546.

Caballero, R. J., Hoshi, T., and A. K. Kashyap, 2008, “Zombie Lending and Depressed Restructuring in Japan”, *American Economic Review* 98(5), 1943-77.

Greenwood, J., Han, P., & Sánchez, J. M. (2022). “Venture capital: a catalyst for innovation and growth”, *Federal Reserve Bank of St. Louis Review*.

Goto, Y., and S. Wilbur, 2019, “Unfinished Business: Zombie Firms among SME in Japan’s Lost Decades”, *Japan and the World Economy* 49, 105-12.

Hofstede, G. 2013. “Values Survey Module”, Available at https://geerthofstede.com/research-and-vsm/vsm-2013/

Hong, G. H., Ito, A., Saito, Y. U., and A. T. N. Nguyen, 2020. “Structural Changes in Japanese Firms: Business Dynamism in an Aging Society”, IMF Working Paper WP/20/182.

Iacus, S. M., King, G., and G. Porro, 2012. “Matching for Causal Inference Without Balance Checking”, *Political Analysis* 20(1), 1-24.

Itai, Y., Maeno, R., Miyoshi, A., and A. Nishino, 2024. “Environment for startups in Japan and Initiatives in the Regional Japan”, *Bank of Japan Review 2024-E-5,* June 2024.

Kerr, W., Lerner, J., and A. Schoar. 2014. “The Consequences of Entrepreneurial Finance”, *Review of Financial Studies* 27(1), 20-55.

Puri, M. and R. Zarutskie. 2012. “On the Life Cycle Dynamics of Venture-Capital and Non-Venture-Capital-Financed Firms”, *Journal of Finance* 67 (6), 2247- 2293.

PUBLICATIONS

Riding Unicorns: Startups and Venture Capital in Japan
Working Paper No. WP/2024/246