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Unicorns: from Silicon Valley to a global phenomenon?

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Unicorns: from Silicon Valley to a global phenomenon?*

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Abstract

While unicorns are often associated with Silicon Valley, new data suggest that this might be changing. This chapter documents how the global geography of unicorns has evolved. It analyses the development of the number of unicorns, relates it to population and explores the distribution over industries. The analysis dedicates particular attention to the role of emerging economies. This is timely, as they have recently taken a more prominent role in the global unicorn landscape. Even though the global distribution of unicorns is highly skewed, an increasing number of unicorns is found beyond the typical hotspots. We develop a research agenda and discuss whether targeting unicorns is sensible policy for emerging economies. We argue that the societal returns of targeting unicorns in emerging economies are highly uncertain.

Keywords: entrepreneurship, unicorns, emerging economies, entrepreneurship policy

JEL classification: L25, L26, M13, O10, O50, P12

Comments welcomed to: Erik Stam, e.stam@uu.nl.

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1. Introduction

Entrepreneurship is widely recognized to be a driver of economic growth and transformation (Schumpeter, 1934). For this reason it has been cherished by governments worldwide. Over the past decades, the entrepreneurship research and policy community has largely shifted its interest from a broad conception of entrepreneurship to a more narrow focus on a limited set of high-growth firms that have been found to contribute disproportionately to economic, employment and productivity growth (Du & Temouri, 2015; Haltiwanger et al., 2017; Henrekson & Johansson, 2010). This has even become narrower with a focus on venture capital-backed high-growth firms. This combination of venture capital, frontier technology and entrepreneurship has become known as the ‘Silicon Valley model for entrepreneurship’ (Audretsch, 2021; Herrmann, 2019). Unicorns, defined as privately held companies worth 1 billion US dollar or more, are perhaps the most mythical manifestation of Silicon Valley entrepreneurship, have drawn attention in particular (Kuckertz et al., 2023).

The unicorn phenomenon is novel both in reality and in terminology. The term was coined only in 2013 by Aileen Lee (2013) in her TechCrunch article “Welcome to the unicorn club: Learning from billion-dollar startups”. Before the 2000s, founders simply took their startups public by issuing common stock (an initial public offering, hereafter: IPO) before reaching unicorn status, rather than granting special privileges to new investors to achieve unicorn valuation. Google (founded 1999, IPO 2004) and Facebook (founded 2004, IPO 2012) are probably the best known unicorns “avant la lettre”. In the last decade, IPOs have become less attractive for the startups that eventually become unicorns. Davydova et al. (2022) explain the rise of unicorns in two parts. First, funding has become increasingly available to unicorns, reducing the funding and liquidity advantages of an IPO for these startups. Second, a new type of “platform company” has emerged that relies more on organizational capital and network effects to create a winner-takes-all-dynamic and achieve market dominance (Parker et al., 2016; Srnicek, 2017). These companies are very valuable if they manage to capture the benefits associated with the organizational capital and network effects that are central to their business plan. The emergence of the new type of firms makes it optimal for firms with unicorn status to stay private as they build up their organizational capital and network, but these firms could not stay private without the increased availability of funding over the past years.

The mystique around unicorns and their potential to disrupt industries and shape the future economy, has resulted in a growing body of research on unicorns (see Giardino et al., 2023) and many countries adopting policy objectives to increase their number of unicorns. The European Commission, for example, has set the objective to double its number of unicorns by 2030 (Mocanu & Thiemann, 2023). The appeal of unicorns goes beyond their potential economic impacts. Mocanu and Thiemann’s (2023) document how the European Commissions’ ambitions to double their number of unicorns also reflects the belief that unicorns are essential to ensure technological leadership and accelerate the green and digital transition. Emerging economies including Indonesia, Malaysia and Vietnam (Sittipoonaeagkapat, 2023), have expressed the ambition to increase their number of unicorns as well, and multiple African cities have been declared the new African Silicon Valley in popular media (Nkontwana & Stam, 2023).

However desirable, entrepreneurship is a rather skewed phenomenon in terms of success. Many new firms fail and only few startups ever reach a substantial size, let alone they reach unicorn status. The improbable emergence of unicorns has also been compared to black swans, calling them black swan start-ups (Mahroum, 2016). Recent studies suggest that the geographical distribution of unicorns is highly uneven too. The United States, China, and, to a lesser extent the European Union, have been found to dominate the unicorn statistics (Testa et al., 2022) and even within those regions the distribution of unicorns is highly uneven. Testa et al. (2022), for instance, report that California, New York and Massachusetts accounted for 75% of all unicorns within the United States in the 2008-2021 period.

Few studies have looked at unicorns in the context of emerging economies. As our data show, many emerging economies have only recently begun to partake in the global unicorn landscape, making it particularly timely to consider their role. The objective of this chapter is to understand how the global geography of unicorns has evolved and to reflect critically on its implications for emerging economies. The aim of this chapter is to gain insight into how the global geography of unicorns has evolved over the past decade and what role emerging economies have played. To this end, we examine the development of the absolute number of unicorns between 2016 and 2024 and relate the number of unicorns to population. Additionally, we explore in what industries unicorns are more present and how this differs over regions.

We are especially interested in the role of emerging economies in the evolving global geography of unicorns, and critically reflect on the implications of these insights on the distribution of unicorns for emerging economies. While a widely accepted definition is not available, definitions of emerging economies often consider the comparatively low level of economic development, high pace of economic growth and the orientation towards a free-market system (Arnold & Quelch, 1998). Because of this discussion, we choose to pragmatically define emerging economies in this chapter based on The World Bank's classification by country income. The World Bank distinguishes between low income, lower-middle income, upper-middle income, and high-income countries. We consider all countries that are not classified as high-income countries to be emerging economies.¹ As China is classified as an upper-middle income country, we will treat China as an emerging economy. Nonetheless, we are aware that China may soon become a high-income country and that scholars have argued that China has developed beyond the emerging economy status (Bruton et al., 2021).

The analysis reveals that unicorns are very unevenly distributed across countries. The United States, China and, to a lesser extent, the European Union, dominate the unicorn population. Meanwhile, the data shows that there is a 'second league' of countries with consistently ten unicorns or more. This suggests that unicorns have become more of a global phenomenon. This is reinforced by the fact that the number of countries with one unicorn or more is widening over time. When we relate the number of unicorns to the population of countries, a more nuanced picture appears. From this analysis, Singapore and Israel emerge as the high-performing countries in terms of unicorn output. Finally, the data demonstrate that about 40% of all unicorns worldwide concentrate in two industries: 'fintech' and 'internet software & services', but this picture changes if we look at different regions. Compared to the global distribution, unicorns in emerging economies are relatively concentrated in the 'e-commerce & direct-to-consumer' and 'fintech' industries. Building on these insights, we develop a research agenda and discuss whether targeting unicorns is sensible policy for emerging economies.

2. Data & Methods

For our analysis, we combined unicorn data from Fortune (Fortune, 2024) (see also Lehmann et al., 2019) and CB Insights (CB Insights, 2024) (see also Davydova et al., 2022; Venâncio et al., 2023). Fortune reported the actual number of unicorns in their online magazine in 2016 and CB Insights provides an online tracker of the actual number of unicorns for the 2018-2024 period (we downloaded the list in February of each year). These datasets contain unicorns defined as privately held companies worth 1 billion US dollar or more. In contrast to some other studies (e.g. Testa et al., 2022), 'exited' unicorns are not included in the datasets. Attribution to countries is based on the actual headquarter location, which can change over time. Based on these sources a unicorn dataset was constructed for 2016 and 2018-2024. The dataset covered all countries with one or more unicorns at any point in this period (57 countries in total). To get a sense of the geographical concentration of unicorns, we calculated location quotients for all countries in the entire period. Location quotients are straightforward descriptive measures of concentration that allow to get a grasp of the number of unicorns compared to what would be expected based on a set denominator. As is common in other studies (Leendertse et al., 2022), we related the number of unicorns to country level population data, retrieved from The World Bank (2023). In this case, a location quotient above one suggests that a country has more unicorns than we would expect based on its number of inhabitants. Conversely, a country with a location quotient below unity has fewer unicorns than we would expect based on its population. The formula for calculating location quotient was as follows:

$$LQ_{cy} = \frac{U_{cy}/P_{cy}}{U_{wy}/P_{wy}}$$

Where LQ_{cy} is the location quotient of a given country 'c' in a given year 'y'. U_{cy} and P_{cy} , are the number of unicorns and the population of the same country respectively. U_{wy} and P_{wy} are the number of unicorns and the population worldwide 'w' in a given year respectively.

The usage of location quotients for understanding the concentration of unicorns is not without limitations. As unicorns are rather exclusive phenomena, the number of data points remains limited. Several countries have at most one unicorn during the period studied. Especially in the first years of the period studied, when the total number of unicorns worldwide is still relatively low, one additional unicorn can have a considerable effect on a country's location quotient. This is even more so in countries with smaller populations. Location quotients

¹ In 2022 the threshold for high-income economies was a gross national income of 13,845 US dollar per capita.

should thus be interpreted with caution (Miller et al., 1991). Additionally, we also computed the number of unicorns per 10 million inhabitants as a more intuitive measure of the density of unicorns per country.

To analyse the industry distribution of unicorns, we relied on the industry categorizations of CB Insights (we use the 2023 data, which is much more finegrained than the 2024 data). Industry classifications differ between Fortune and CB Insights and have changed over the years, which makes longitudinal comparisons arduous. Therefore, we have decided to limit this analysis to 2023 industry distribution.

3. Results

Over the past eight years, the number of unicorns worldwide has increased dramatically from 174 unicorns in 2016 to 1230 in 2024 (the number and share of unicorns per country are reported in Tables A1 and A2). While our data are insufficient to provide a conclusive explanation for this stark increase, the supply of venture capital offers a potential explanation. Low interest rates driven by quantitative easing policies enabled the growth of private equity, with global venture capital investments increasing sharply from 2016 onwards and peaked in 2021 (CB Insights, 2024). The vast supply of venture capital may not just affect the number of high-growth firms, it also allows firms to remain private longer with the consequence of more firms reaching unicorn status. Overvaluation, perhaps driven by the desire of entrepreneurs and investors to reach unicorn status, provides another explanation for the growing numbers of unicorns (Gornall & Strebulaev, 2020).

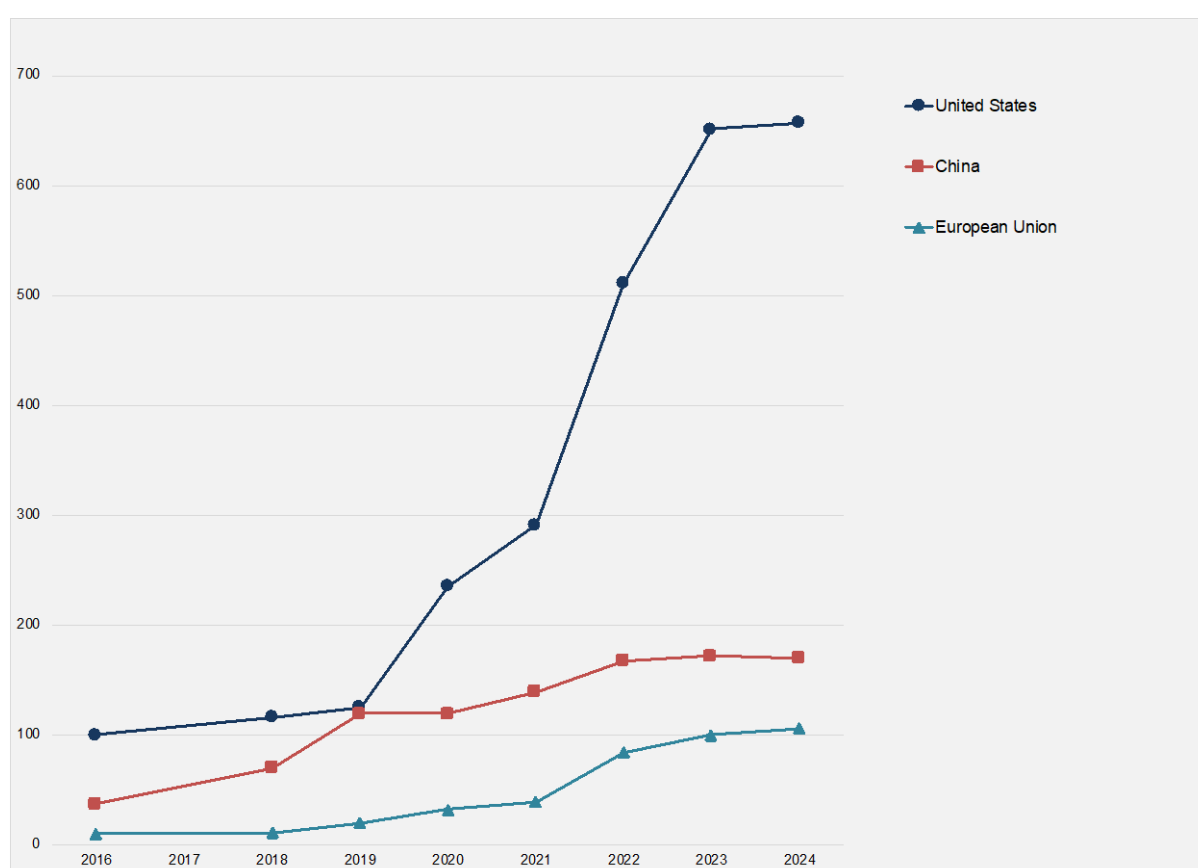


Figure 1. Number of unicorns in China, the European Union and the United States, 2016 and 2018-2024 (data source: CB Insights and Fortune).

The data show that in 2016 over two-thirds of all unicorns worldwide could be found in two countries: the United States (57%) and China (21%). The European Union, if considered as a whole, trails far behind with only 6% of all unicorns. In 2016, only 13 other countries had at least one unicorn. In the subsequent years, the United States maintained its leading position as the nursery for unicorns throughout the years and has, in absolute terms, significantly widened the gap with China. Only in 2019, the United States was nearly overtaken by China, with 125 and 119 unicorns respectively. After that year, the gap between the United States vis-à-vis China and the European Union has widened in absolute terms (see Figure 1). In some respects, this picture has not changed much in 2024. Whilst the total number of unicorns worldwide has increased to 1230, the triad of the United

States, China and, to a lesser extent, the European Union holds. The dominant position of the United States and China has not changed much. The United States is still responsible for the majority of unicorns (657 unicorns, 53%), again followed by China, albeit with a smaller share of unicorns worldwide (170 unicorns 14%), and the European Union retains its third position, accounting for 106 unicorns (9%).

Although the United States, China and the European Union remain leading in terms of unicorn output, the increase in unicorns worldwide has resulted in meaningful changes. In 2024 unicorns could be found in 52 countries, whereas only 16 countries had at least one unicorn in 2016. As Figure 2 depicts, a 'second league' for unicorns seems to emerge with countries that consistently have ten or more of unicorns since 2020: led by India and the United Kingdom, followed by Germany and South Korea. From 2021 onwards, Brazil, Israel, France, Canada, and Singapore join this group. Brazil and India stand out as the only two emerging economies in the 'second league'. India's case is particularly interesting, given its significantly lower GDP per capita compared to the other countries that make up this group (Brazil's GDP per capita is about three times higher).

There is remarkable heterogeneity within the (once) leading emerging economies BRICS group. While China is leading in absolute number, just after the US, and Brazil and India host a strongly increasing and substantial number of unicorns, Russia and South-Africa are stagnating at best, with Russia even having had only one unicorn in 2019. Indonesia and Mexico now seem to be better positioned than these two lagging BRICS members.

India and Brazil are the most prominent runner ups. India started a large scale entrepreneurship policy in 2016, with 'Startup India' (Khanna, 2022; Tiwari et al., 2021). Most of its unicorns (and venture capital) are located in Mumbai, Bangalore and Delhi. Although India has taken important steps, its entrepreneurial ecosystem still suffers from serious issues (Khanna, 2022; Tiwari et al., 2021). The government has set up a fund-of-funds to tackle the severely constrained access to finance in India, which is not yet fulfilling its promise (Tiwari et al., 2021). Moreover, scholars have observed that investments concentrate in relatively low-tech sectors as opposed to science-based startups, due to lack of access to knowledge (Khanna, 2022).

Brazil started a large scale entrepreneurship policy in 2013, with "Startup Brasil". Many (for-profit and public) accelerators have been started, and especially since 2017 many Venture Capitalists entered Brasil. Unique to Brazilian startups is that they have particularly targeted Brazilian problems, including high transaction costs, information asymmetries, underdeveloped logistics and imperfect regulatory systems (institutional voids). They have managed to address and overcome these frictions and inefficiencies (also known as "Brazil cost" which refers to the fact that many aspects of doing business are simply more expensive than in comparable countries) through technology. Interestingly, these 'institutional voids' may give Brazilian startups a head start vis-à-vis international competitors that lack a thorough understanding of such contextual conditions.

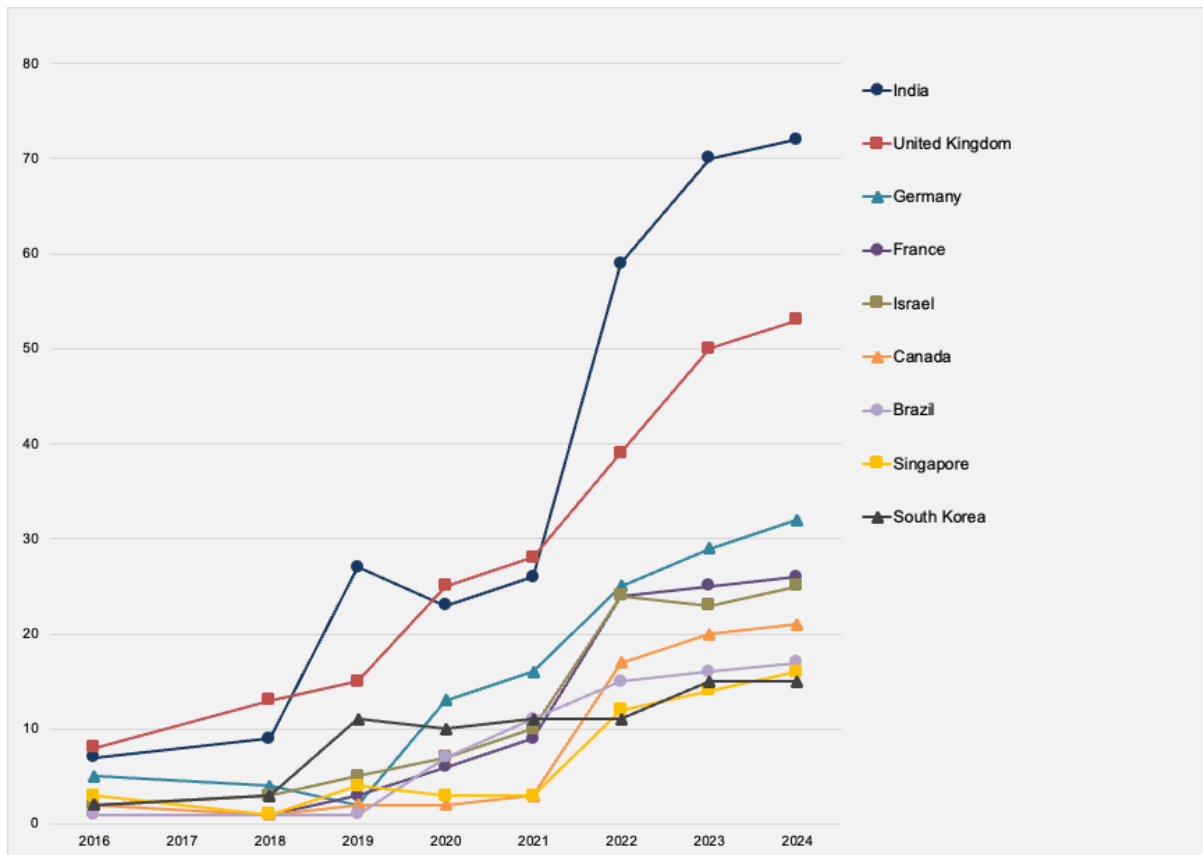


Figure 2. Number of unicorns in selected countries (all countries >10 unicorns in 2024, excluding China and the United States), 2016 and 2018-2024 (data source: CB Insights and Fortune).

It is notable that many countries do not go along in the upward trend of more unicorns worldwide. Most countries had no unicorn at all at any point in the period studied (2016, 2018-2024). Moreover, about half of all countries that did have at least one unicorn in the period studied never had more than two unicorns in a given year. This group include countries across continents, such as Argentina, Denmark, and Senegal. It is perhaps no surprise that most emerging economies are among this group. Figure 3 zooms in on emerging economies. It shows how the number of unicorns has developed in emerging economies (excluding China) that had at least 2 unicorns in 2024. A final remarkable observation is that within this group, we see many newcomers in 2022, 2023 and 2024 (i.e. countries with their first unicorn): in Europe (Austria, Denmark, Greece, Norway, Finland, Italy and Liechtenstein), but also in Africa (Egypt, Senegal, Seychelles), South America (Ecuador), Asia (Malaysia, Saudi Arabia, Thailand, Vietnam) and North America (Cayman Islands). This suggests that, even though the geographical distribution remains highly skewed, unicorns have become more of a global phenomenon and a growing number of emerging economies have at least one unicorn.

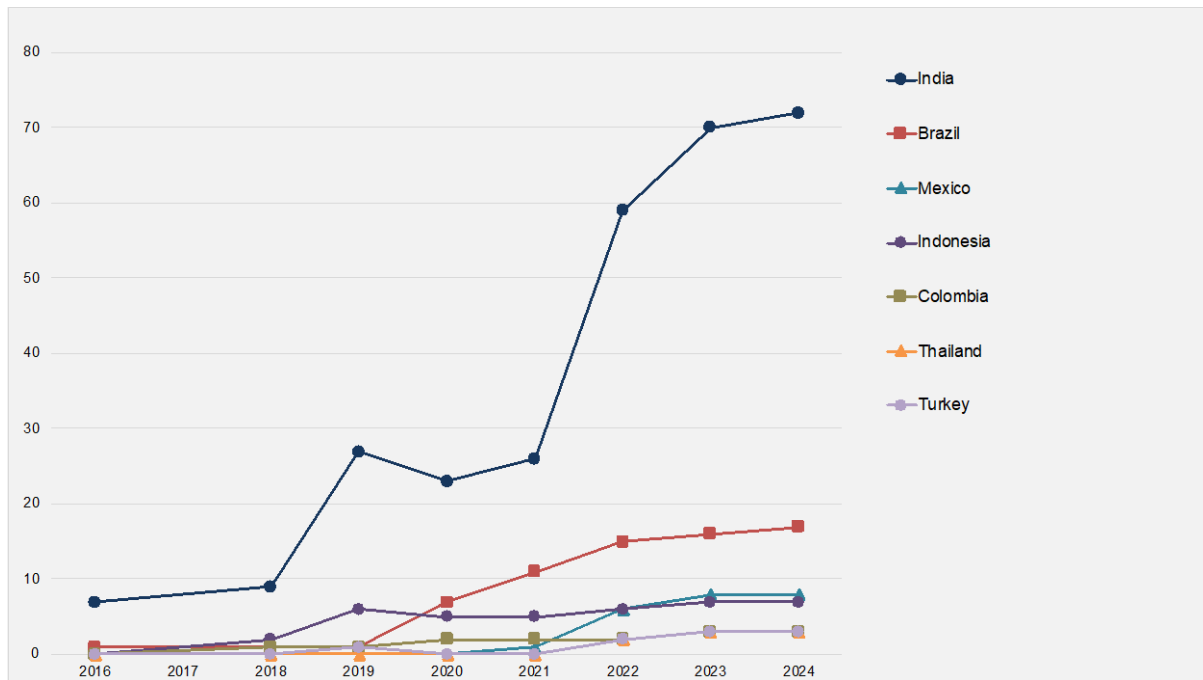


Figure 3. Number of unicorns in emerging economies (>2 unicorns in 2024, excluding China), 2016 and 2018-2024 (data source: CB Insights and Fortune).

3.1. Unicorn concentration

A representation of the geographical distribution of unicorns that is more balanced, and arguably more relevant from an entrepreneurship policy perspective, is the number of unicorns per country relative to its population. Table 1 presents how the unicorn location quotients for a selected number of countries have changed over time (Table A3 presents a full overview, Table A4 reports the number of unicorns per 10 million inhabitants)². If we rank the location quotients from high to low a picture emerges that is different from the absolute ranking of the number of unicorns per country. A first observation is that, while the United States still has a location quotient well above unity in all covered years, it is outperformed by smaller economies. As of 2022, Singapore and Israel emerge as the top performing countries in terms of the number of unicorns relative to their population with location quotients of 18.73 and 17.26 in 2024 respectively.³ These location quotients suggest that despite their relatively small populations, they manage to generate high numbers of unicorns. Israel is widely acknowledged to be an entrepreneurial powerhouse. Through dedicated government intervention, the Israeli government has managed to transform its economy characterized by extremely low levels of research and development in the 1960s to a strong ecosystem for high-tech entrepreneurship (Brennitz, 2007). Most notable are perhaps the country's efforts to build a thriving venture capital industry from scratch (Klingler-Vidra et al., 2016).

Where fostering entrepreneurship has been central to Israel's economic strategy, economic policymaking in Singapore has for a long time revolved around the attraction of foreign multinational companies. Recently, Singapore has shifted its focus to entrepreneurship and innovation. At face value, a favorable interpretation of the development of Singapore's unicorn location quotient would be that this strategy bears fruit. This is particularly intriguing given that the active involvement of the Singaporean state has been critiqued for hindering entrepreneurship (Audretsch & Fiedler, 2023; Cheang, 2022). Audretsch and Fiedler (2023) suggest an alternative explanation, namely that in 2021 all Singaporean unicorns were founded by foreign nationals. In 2024, one of these examples is Moglix, a unicorn founded by the Indian entrepreneur Rahul Garg. While Moglix is based in Singapore, it is a leading e-commerce company for industrial tools and equipment in India (Balachandran, 2021).

² We also computed the location quotients based on GDP instead of population, but the results are not qualitatively different.

³ It should be noted that Bermuda, the Cayman Islands, Liechtenstein, and the Seychelles also have location quotients higher than the United States and, as a matter of fact, higher than Israel and Singapore as well (see Table A3). Their high location quotients are in all four cases explained by the presence of a single or two unicorn(s) which, given their small populations, has resulted in extraordinarily high location quotients. As the presence of these single unicorns may be partly due to favourable tax conditions, we have decided not to include them in Table 1. These location quotients are reported in Table A3.

Table 1. Unicorn location quotients of selected countries ranked from high to low, 2016-2023 (see Table A3 for a full overview).

	2016	2018	2019	2020	2021	2022	2023	2024
Singapore	23.03	5.66	15.29	8.40	7.33	16.93	16.39	18.73
Israel	10.07	10.78	12.04	12.10	14.22	19.97	15.88	17.26
United States	13.32	11.33	8.30	11.29	11.68	12.19	12.89	13.01
Estonia	0.00	0.00	16.44	11.98	10.01	11.79	9.78	9.78
Ireland	0.00	0.00	0.00	3.19	2.65	7.75	7.72	9.01
European Union	0.97	0.79	0.97	1.14	1.16	1.49	1.47	1.53
China	1.15	1.59	1.84	1.34	1.31	0.94	0.80	0.79
Brazil	0.21	0.15	0.10	0.52	0.68	0.55	0.49	0.52
India	0.23	0.21	0.43	0.26	0.25	0.33	0.33	0.34
South Africa	0.00	1.11	0.00	0.54	0.45	0.27	0.22	0.11
Indonesia	0.00	0.24	0.49	0.29	0.24	0.17	0.17	0.17

If we compare China, the European Union, and the United States again, it shows there is a landslide difference between the United States and the other leading economic powers. In 2024, the United States has 13 times more unicorns than we would expect based on its population. Only in 2019 the country's location quotient dropped below 10, reflecting a rather constant performance. The continued strong position of the United States is perhaps no surprise. Investments in R&D and venture capital, two important inputs for unicorns, are much higher in the United States. Moreover, the country is characterized by formal and informal institutions that foster high-growth entrepreneurship (Herrmann, 2019), such as flexible labor markets and a culture that favors ambitious entrepreneurship (Fagerberg et al., 2014; Herrmann, 2019; Stam, 2021).

The concentration of unicorns in China is considerably lower and has declined in recent years. Nevertheless, if we consider the entire period studied, China's location quotient is above unity in most years. This implies that China's number of unicorns is largely in accordance with what could be expected based on its population. If we consider China's history, this is nevertheless quite an achievement. Since its economic reforms in the 1980s, the Chinese government has been committed to private sector development. Investments in science and technology have been an important cornerstone of this strategy. More recently, the Chinese government has also placed more emphasis on creating an environment that is conducive to innovative entrepreneurship (Poon et al., 2023). These changes are also reflected in the government's commitment to the development of the Chinese venture capital market, which increased steadily over the past decade and is now the second venture capital market in the world (Malkin, 2021).

Like China, the European Union has a location quotient that revolves around one in the years studied, but in contrast to China the trend is positive. The positive trend of the European Union's location quotient reflects the increased performance of some member states in the 2016-2024 period, including Estonia, France, and Ireland. Mocanu and Thiemann (2023) analyze the European Union's ambition to double its number of unicorns by 2030. Their analysis highlights that these ambitions are driven not solely by the direct economic value associated with these extreme types of entrepreneurship. Instigated by geopolitical developments, policies to breed unicorns are also intended to secure technological sovereignty.

If we turn the lens to emerging economies, it becomes clear that only a handful of emerging economies are among the well-performing economies (i.e. economies with a location quotient above unity). Large emerging economies, like Brazil and India, have location quotients well below one. Smaller emerging economies, like South Africa and Uruguay, have location quotients above one in some of the years studied, but fail to maintain that position.

3.2. Industry distribution

Tables A5, A6 and A7 (included in the appendix) report the distribution of unicorns over industries per global region in 2023. The data show that unicorns are more common in certain sectors. Worldwide about 40% of all unicorns concentrate in 'fintech' and 'internet software & services'. One explanation for the dominance of these industries might be that software companies tend to scale faster than hardware companies (De la Tour et al., 2017). The distribution of North American unicorns over industries is driving the global pattern. In Europe and South America relatively many unicorns concentrate in the 'fintech' sector, comprising 33% and 44% of the total

respectively. Given the low numbers of unicorns in Africa and Oceania, these industry distributions are little informative.

The distribution of Asian unicorns over industries is much more dispersed. The 'e-commerce & direct to consumer' industry stands out, being almost twice as high in terms of percentage points (17% vs. 9%). If we consider Asia's unicorn profile in relation to the rest of the world, it becomes clear that even though 27% of all unicorns are based in Asia, 50% or more of the unicorns in 'automotive & transportation', 'e-commerce & direct to consumer', 'edtech', 'hardware', 'mobile & telecommunications' and 'travel' are headquartered on this continent. This reflects that in Asia's unicorn profile hardware-based industries are relatively more dominant. North America's unicorn profile, in contrast, seems more inclined towards software-based industries, with 83% of cybersecurity startups and 74% of all internet software & services startups, 78% data management & analytics, to name some examples. This might reflect a relative strength of these regions in these particular industries.

Andonova et al. (2021) have demonstrated that unicorns in emerging economies tend to concentrate in lower-tech mass domains. A closer look at the industry distribution among all unicorns in emerging economies confirms this. The data indicate a relative concentration of emerging economy unicorns in the 'e-commerce & direct-to-consumer' and 'fintech' industries. Andonova et al. (2021) do not consider China an emerging economy. If we exclude China from our list of emerging economies, the concentration is even higher for both industries. Of all unicorns in the remaining emerging economies 22% and 32% can be found in the 'e-commerce & direct-to-consumer' and 'fintech' industries respectively. Distinct opportunities in these sectors in emerging economies might explain this concentration. Emerging economies face particular challenges, such as high levels of unbanked individuals (Demirgüç-Kunt et al., 2015), that simultaneously might provide business opportunities for large scale, low-cost solutions that overcome these challenges (Andonova et al., 2021).

4. Conclusion and discussion

Unicorns have become exclusive symbols of entrepreneurial success and have an extraordinary appeal to policymakers. The aim of this chapter was to gain insight into how the global geography of unicorns has evolved over the past decade and what role emerging economies have played. From the analysis we can draw three conclusions.

First of all, our analyses reveal a highly skewed distribution of unicorns across the globe. This is accentuated by the dominant position of the United States, China and, albeit to a lesser extent, the European Union. Their dominance holds over time, but the gap between the United States vis-à-vis China and the European Union has widened since 2020. This is an important observation from a hegemony perspective, as unicorns have the potential to have a large impact on the global economy, as well as on societies. At the same time, we see a 'second league' of countries emerge of countries that consistently have more than ten unicorns. This suggests that over the past eight years unicorns have become a more global phenomenon. This proposition is further reinforced by the finding that the number of countries with at least one unicorn is widening. This group includes multiple emerging economies as well.

Relating the number of unicorns to population results in a more nuanced picture. The unicorn location quotient analysis reveals that Singapore and Israel are the best performing countries in 2024. They are followed by the United States which has a consistently high number of unicorns relative to its population. China and the European Union, in contrast, perform averagely in most years. Relating unicorn output to population is arguably more relevant from a policy perspective, as it can be indicative of the extent to which countries are living up to their potential. Accordingly, the performance of Israel, Singapore, and some other recent high performers like Estonia and Ireland, is intriguing. However, within (especially large) countries we see a strong spatial concentration of unicorns, and if California, Massachusetts in the United States and Shanghai and Beijing in China would be countries, they would perform even better than Singapore and Israel.

Whether the high numbers of unicorns in particular places is a matter of coincidence or the result of effective government intervention deserves further scrutiny. With few exceptions, emerging economies perform below what we would expect based on their populations. This is perhaps no surprise, as population is clearly no ideal predictor of high-growth entrepreneurship. Instead, why certain localities produce more entrepreneurial output than others is explained by a set of factors, such as access to finance and talent, sufficient infrastructure, and new knowledge creation, that enable entrepreneurship (Stam, 2015; Leendertse et al., 2022). These contextual

factors might be less robust in emerging economies, with entrepreneurial ecosystems not yet being “mature” (Kantis et al., 2020).

Finally, our analyses indicate that unicorns are distributed unevenly over industries. On a global level, around 40% of the unicorns are active within the ‘fintech’ and ‘internet software & services’ industry. The industry distribution differs per region. The distribution of Asian unicorns is much relatively more dispersed over industries. Considering the number of Asian and North American unicorns per industry in relation to the global unicorn population, reveals that Asia’s unicorn profile is more hardware-based, whereas North America’s unicorn profile is more software-based. This might reflect a relative strength of these economic powers in these respective industries. An examination of emerging economy unicorns highlights a concentration within the ‘e-commerce & direct-to-consumer’ and ‘fintech’ industries.

4.1. Implications for future research

The explorative analyses presented in this chapter raise various questions for future research. First of all, the analysis highlights unicorns are distributed rather unevenly over countries. This raises the question: what conditions are needed to nurture unicorns and what role can governments play in this process? The entrepreneurial ecosystem approach (Stam, 2015; Wurth et al., 2022) might be a useful starting point to explain these differences. A recent study on European regions shows that the quality of entrepreneurial ecosystems is a strong predictor of the prevalence of unicorns (Leendertse et al., 2022). It would be interesting to explore further whether specific entrepreneurial ecosystems configurations are more conducive to unicorns than others (cf. Schrijvers et al., 2023; Venâncio et al., 2023). This is especially relevant from the perspective of emerging economies, as much of the entrepreneurial ecosystem literature builds on insights generated in high-income economies.

How unicorns create value for their localities presents another relevant direction for future research. Although unicorns have been idolized as entrepreneurial success stories, concerns have been raised about how they create value, at what cost and for whom. Scholars have pointed out that entrepreneurship has a direction too: financial valuation does not equate social value creation (Kuckertz et al., 2023; Mazzucato, 2018). Accordingly, other types of entrepreneurship might better fit an inclusive economic growth paradigm (Audretsch, 2021; Breznitz, 2021; Herrmann, 2019). While we concur with these concerns, few studies have in-depth explored the impacts of unicorns on their communities. Such efforts could contribute to the discussion about more inclusive types of entrepreneurship and shed new light on studies that have proxied unicorn presence with productive entrepreneurship (e.g. Leendertse et al., 2022) or even suggested that unicorn output reflects the maturity of the ecosystem (Andonova et al., 2021).

Studying value creation by unicorns is especially relevant in the context of emerging economies, because emerging economy contexts might offer opportunities for value creation that are distinct from those in high-income economies:

“We conjecture that the natural and endowed conditions of emerging economies such as large populations coupled with a lack of basic infrastructure and services offer excellent opportunities for unicorns, which can provide solutions and even boost technological leap-frogging in basic services such as banking or education.” (Andonova et al., 2021, p. 181).

Feferman (2022) makes a similar point in his account of the recent development of the Brazilian entrepreneurial ecosystem. Brazilian startups have relied on technology to address what are in Brazil known as ‘Brazil cost’: *“the inefficiencies and challenges that plague business and daily life in the country.”* (Feferman, 2022: 408). He even suggests that in the context of Brazil such ‘institutional voids’ put Brazilian startups at an advantage vis-à-vis foreign firms who lack a deep understanding of the institutional context.

These arguments resemble the concept of market-creating innovations, which emphasizes the importance of accessible and affordable innovations that reach large underserved groups of people who had no access to the product or service before (Christensen et al., 2018). The American unicorn Zipline is an interesting example. The company uses autonomous drones for precise delivery in areas where infrastructure (or the lack thereof) inhibit fast delivery of goods. Zipline was founded and is based in the United States but started its operations in Rwanda initially delivering blood and medical products (Zipline, n.d.). Exploring whether the success of unicorns in

emerging economies can indeed be attributed to such market creating innovations would be a valuable next step.

Investigating relocation behavior of unicorns presents a final avenue for future research. Like other multinational companies, unicorns are not necessarily tied to the locality where they were founded but may be footloose. A recent study shows that 40 of 147 the unicorns founded in the European Union between 2008 to 2021 relocated their headquarters elsewhere, predominantly to the United States (Testa et al., 2022). The authors hypothesize that access to venture capital is an important explanation, but more research is needed to assess that hypothesis, as well as what other factors explain why unicorns are footloose. The case of Singapore is an intriguing one. Many founders of unicorns headquartered in the city-state were founded elsewhere (Audretsch & Fiedler, 2023). Whether this makes them more prone to leave compared to ventures founded by local entrepreneurs, deserves further analysis. Singapore's situation, illustrated by the Moglix case, furthermore highlights that unicorn locations may say little about which markets unicorns serve and, thus, where they create most value for consumers. Future studies should take this into consideration when discussing the value of unicorns.

4.2. Policy implications for emerging economies: is targeting unicorns sensible policy?

One question that rises, is whether targeting unicorns is sensible policy for emerging economies that currently lag in terms of unicorn output. Unicorns are exclusive phenomena that have been embraced by policymakers to generate economic development, as well as to enhance hegemony in a global economy tempered by geopolitical tensions (Mocanu & Thiemann, 2023). While there is a case to be made for targeting unicorns, their exclusiveness is their pitfall too and makes chasing unicorns tricky policy for pragmatic and normative reasons.

An initial argument for caution would be that scholars have extensively documented how hard it is to *a priori* identify high-growth firms, let alone unicorns (Bosma & Stam, 2012; Terjesen et al., 2016). For one thing, as Brown et al. (2017, p.418) have stressed, high growth is a state rather than a characteristic of a firm, making high-growth firms "*effectively a 'moving target'*". This challenge, combined with the lack of sound evidence supporting the effectiveness of policies to foster high-growth firms (Lerner, 2009; Mason & Brown, 2013), begs the question whether targeting unicorns is effective policy. As noted earlier, relocation behavior poses a second concern. The risk of unicorns leaving the country where they were founded might even be a bigger risk for emerging economies, as their institutions, internal market and venture capital market tend to be less developed. From a policy perspective, this suggests that actively investing in creating unicorns may be insufficient to capture the value created by this exclusive subset of firms. Retaining unicorns is necessary too, but relocation behavior of unicorns and the underlying motivations are hardly researched.

Moreover, while many countries have attempted to imitate Silicon Valley, as it has proven to be fertile ground for unicorns, most efforts failed. The *Varieties of Capitalism* framework proposed by Hall and Soskice (2001) and applied to entrepreneurship (Dilli et al., 2018) might offer cues for understanding these failed efforts. In short, the argument is that institutions, defined as the formal and informal 'rules of the game', determine how important resources for entrepreneurship (e.g. finance, talent, and knowledge) are allocated, how relationships are governed, and how economic activities are coordinated. Different institutional contexts explain why liberal market economies, such as the United States, are better able to foster typical Silicon Valley entrepreneurship. Coordinated market economies in contrast, commonly illustrated by the case of Germany, are more conducive to medium-tech entrepreneurship characterized by incremental innovation. Following this logic, emerging economies should not blindly chase unicorns, but concentrate on types of entrepreneurship that fit their local institutional context – 'comparative institutional advantage' (Hall & Soskice, 2001).

Finally, there is a normative argument to be made against embracing unicorns as a target for entrepreneurship policy. While Silicon Valley and Israel's startup ecosystem are widely regarded success stories of entrepreneurship and innovation, scholars have showed there is a dark side to these stories as well. For one thing, both localities are characterized by high levels of inequality (Breznitz, 2021; Kwon & Sorenson, 2023), which is already a burning issue for many emerging economies. This finding resonates with the conclusions of studies on the micro-level stakeholder effects of high-growth firms, showing that high-growth may come at the cost of stakeholders of the firm (Kuratko et al., 2020; Schrijvers & Vogelaar, 2023). Moreover, a successful high-tech industry might have negative consequences for other parts of the economy. A concentration of high-tech firms raises the cost of doing business, as salaries and prices go up, and attracts human and financial capital at

the cost of other sectors. In the long-run this can lead to a less diversified and thus less resilient economy (Kwon & Sorenson, 2023).

In conclusion, policymakers in emerging economies find themselves in a difficult spot. While the appeal of unicorns is understandable, many emerging economies play a limited role in the global unicorn landscape thus far. Whether it is sensible to try to alter this with entrepreneurship policy remains to be seen. The critical perspective provided here highlights that targeting unicorns is difficult and their effects are not unequivocally positive. Instead of chasing the Silicon Valley model of entrepreneurship, scholars have suggested policymakers foster types of entrepreneurship that better fit their local context (Audretsch, 2021; Breznitz, 2021; Herrmann, 2019), in particular in emerging economies (Nkontwana & Stam, 2023). Although it is an empirical question whether the negatives outweigh the positives, the discussed repercussions of unicorns on their respective localities underscore the need for policymakers in emerging economies to adopt a more nuanced perspective towards these mythical entrepreneurial creatures.

Appendix

Table A1. Unicorns per country, 2016 and 2018-2024.

	2016	2018	2019	2020	2021	2022	2023	2024
Argentina	0	0	1	0	0	1	1	1
Australia	0	1	3	2	3	6	8	9
Austria	0	0	0	0	0	2	2	2
Belgium	0	0	2	0	1	3	3	3
Bermuda	0	0	0	0	1	1	1	1
Brazil	1	1	1	7	11	15	16	17
Canada	2	1	2	2	3	17	20	21
Cayman Islands	0	0	0	0	0	0	0	1
Chile	0	0	1	0	0	2	2	2
China	37	70	119	119	139	167	172	170
Colombia	0	1	1	2	2	2	3	3
Croatia	0	0	0	1	1	1	2	2
Czech Republic	1	1	0	0	0	1	1	1
Denmark	0	0	0	0	0	2	2	2
Ecuador	0	0	0	0	0	0	1	1
Egypt	0	0	0	0	0	0	0	1
Estonia	0	0	1	1	1	2	2	2
Finland	0	0	0	0	0	2	4	4
France	1	1	3	6	9	24	25	26
Germany	5	4	2	13	16	25	29	32
Greece	0	0	0	0	0	0	0	2
Hong Kong	0	0	4	5	4	7	7	6
India	7	9	27	23	26	59	70	72
Indonesia	0	2	6	5	5	6	7	7
Ireland	0	0	0	1	1	5	6	7
Israel	2	3	5	7	10	24	23	25
Italy	0	0	0	0	0	0	2	2
Japan	0	2	2	4	4	6	6	7
Liechtenstein	0	0	0	0	0	0	1	1
Lithuania	0	0	1	1	1	1	2	2
Luxembourg	0	1	2	1	1	1	1	1
Malaysia	0	0	0	0	0	1	1	1
Malta	0	1	0	0	0	0	0	0
Mexico	0	0	0	0	1	6	8	8
Netherlands	1	2	0	2	3	5	7	7
Nigeria	0	1	0	0	0	1	1	1
Norway	0	0	0	0	0	4	4	4
Philippines	0	0	0	1	1	2	2	1
Portugal	0	0	3	1	0	0	0	0
Russia	1	0	1	0	0	0	0	0
Saudi Arabia	0	0	0	0	0	0	0	1

Senegal	0	0	0	0	0	1	1	1
Seychelles	0	0	0	0	0	0	1	2
Singapore	3	1	4	3	3	12	14	16
South Africa	0	2	0	2	2	2	2	1
South Korea	2	3	11	10	11	11	15	15
Spain	0	0	2	2	2	4	5	5
Sweden	2	1	4	3	3	6	7	6
Switzerland	0	2	3	4	5	4	6	5
Thailand	0	0	0	0	0	2	3	3
Turkey	0	0	1	0	0	2	3	3
Ukraine	0	0	2	0	0	0	0	0
United Arab Emirates	1	1	1	2	2	3	3	5
United Kingdom	8	13	15	25	28	39	50	53
United States	100	116	125	235	291	511	651	657
Uruguay	0	0	0	1	1	0	0	0
Vietnam	0	0	0	0	0	2	2	2
World	100	116	125	235	291	511	651	657

Notes: The unicorn data was gathered from Fortune and CB Insights. Countries that had no unicorn at any point in the period studied (2016, 2018-2023), are not included in this table.

Table A2. Share of unicorns per country, 2016 and 2018-2024.

	2016	2018	2019	2020	2021	2022	2023	2024
Argentina	0.00%	0.00%	0.28%	0.00%	0.00%	0.10%	0.08%	0.08%
Australia	0.00%	0.42%	0.85%	0.41%	0.51%	0.60%	0.66%	0.73%
Austria	0.00%	0.00%	0.00%	0.00%	0.00%	0.20%	0.17%	0.16%
Belgium	0.00%	0.00%	0.56%	0.00%	0.17%	0.30%	0.25%	0.24%
Bermuda	0.00%	0.00%	0.00%	0.00%	0.17%	0.10%	0.08%	0.08%
Brazil	0.57%	0.42%	0.28%	1.43%	1.86%	1.50%	1.33%	1.38%
Canada	1.15%	0.42%	0.56%	0.41%	0.51%	1.70%	1.66%	1.71%
Cayman Islands	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.08%
Chile	0.00%	0.00%	0.28%	0.00%	0.00%	0.20%	0.17%	0.16%
China	21.26%	29.17%	33.52%	24.24%	23.48%	16.70%	14.27%	13.82%
Colombia	0.00%	0.42%	0.28%	0.41%	0.34%	0.20%	0.25%	0.24%
Croatia	0.00%	0.00%	0.00%	0.20%	0.17%	0.10%	0.17%	0.16%
Czech Republic	0.57%	0.42%	0.00%	0.00%	0.00%	0.10%	0.08%	0.08%
Denmark	0.00%	0.00%	0.00%	0.00%	0.00%	0.20%	0.17%	0.16%
Ecuador	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.08%	0.08%
Egypt	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.08%
Estonia	0.00%	0.00%	0.28%	0.20%	0.17%	0.20%	0.17%	0.16%
Finland	0.00%	0.00%	0.00%	0.00%	0.00%	0.20%	0.33%	0.33%
France	0.57%	0.42%	0.85%	1.22%	1.52%	2.40%	2.07%	2.11%
Germany	2.87%	1.67%	0.56%	2.65%	2.70%	2.50%	2.41%	2.60%
Greece	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.16%
Hong Kong	0.00%	0.00%	1.13%	1.02%	0.68%	0.70%	0.58%	0.49%
India	4.02%	3.75%	7.61%	4.68%	4.39%	5.90%	5.81%	5.85%

Indonesia	0.00%	0.83%	1.69%	1.02%	0.84%	0.60%	0.58%	0.57%
Ireland	0.00%	0.00%	0.00%	0.20%	0.17%	0.50%	0.50%	0.57%
Israel	1.15%	1.25%	1.41%	1.43%	1.69%	2.40%	1.91%	2.03%
Italy	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.17%	0.16%
Japan	0.00%	0.83%	0.56%	0.81%	0.68%	0.60%	0.50%	0.57%
Liechtenstein	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.08%	0.08%
Lithuania	0.00%	0.00%	0.28%	0.20%	0.17%	0.10%	0.17%	0.16%
Luxembourg	0.00%	0.42%	0.56%	0.20%	0.17%	0.10%	0.08%	0.08%
Malaysia	0.00%	0.00%	0.00%	0.00%	0.00%	0.10%	0.08%	0.08%
Malta	0.00%	0.42%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Mexico	0.00%	0.00%	0.00%	0.00%	0.17%	0.60%	0.66%	0.65%
Netherlands	0.57%	0.83%	0.00%	0.41%	0.51%	0.50%	0.58%	0.57%
Nigeria	0.00%	0.42%	0.00%	0.00%	0.00%	0.10%	0.08%	0.08%
Norway	0.00%	0.00%	0.00%	0.00%	0.00%	0.40%	0.33%	0.33%
Philippines	0.00%	0.00%	0.00%	0.20%	0.17%	0.20%	0.17%	0.08%
Portugal	0.00%	0.00%	0.85%	0.20%	0.00%	0.00%	0.00%	0.00%
Russia	0.57%	0.00%	0.28%	0.00%	0.00%	0.00%	0.00%	0.00%
Saudi Arabia	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.08%
Senegal	0.00%	0.00%	0.00%	0.00%	0.00%	0.10%	0.08%	0.08%
Seychelles	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.08%	0.16%
Singapore	1.72%	0.42%	1.13%	0.61%	0.51%	1.20%	1.16%	1.30%
South Africa	0.00%	0.83%	0.00%	0.41%	0.34%	0.20%	0.17%	0.08%
South Korea	1.15%	1.25%	3.10%	2.04%	1.86%	1.10%	1.24%	1.22%
Spain	0.00%	0.00%	0.56%	0.41%	0.34%	0.40%	0.41%	0.41%
Sweden	1.15%	0.42%	1.13%	0.61%	0.51%	0.60%	0.58%	0.49%
Switzerland	0.00%	0.83%	0.85%	0.81%	0.84%	0.40%	0.50%	0.41%
Thailand	0.00%	0.00%	0.00%	0.00%	0.00%	0.20%	0.25%	0.24%
Turkey	0.00%	0.00%	0.28%	0.00%	0.00%	0.20%	0.25%	0.24%
Ukraine	0.00%	0.00%	0.56%	0.00%	0.00%	0.00%	0.00%	0.00%
United Arab Emirates	0.57%	0.42%	0.28%	0.41%	0.34%	0.30%	0.25%	0.41%
United Kingdom	4.60%	5.42%	4.23%	5.09%	4.73%	3.90%	4.15%	4.31%
United States	57.47%	48.33%	35.21%	47.86%	49.16%	51.10%	54.02%	53.41%
Uruguay	0.00%	0.00%	0.00%	0.20%	0.17%	0.00%	0.00%	0.00%
Vietnam	0.00%	0.00%	0.00%	0.00%	0.00%	0.20%	0.17%	0.16%
World	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Notes: The unicorn data was gathered from Fortune and CB Insights. Countries that had no unicorn at any point in the period studied (2016, 2018-2023), are not included in this table.

Table A3. Unicorn location quotients per country, 2016 and 2018-2024.

	2016	2018	2019	2020	2021	2022	2023	2024
Argentina	0.00	0.00	0.49	0.00	0.00	0.17	0.14	0.14
Australia	0.00	1.28	2.58	1.24	1.56	1.83	2.03	2.28
Austria	0.00	0.00	0.00	0.00	0.00	1.76	1.46	1.46
Belgium	0.00	0.00	3.80	0.00	1.15	2.04	1.69	1.69
Bermuda	0.00	0.00	0.00	0.00	208.97	125.15	103.86	103.86

Brazil	0.21	0.15	0.10	0.52	0.68	0.55	0.49	0.52
Canada	2.38	0.86	1.16	0.84	1.05	3.47	3.39	3.56
Cayman Islands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	96.04
Chile	0.00	0.00	1.15	0.00	0.00	0.81	0.67	0.67
China	1.15	1.59	1.84	1.34	1.31	0.94	0.80	0.79
Colombia	0.00	0.65	0.43	0.63	0.52	0.31	0.38	0.38
Croatia	0.00	0.00	0.00	3.93	3.44	2.06	3.42	3.42
Czech Republic	4.07	3.00	0.00	0.00	0.00	0.75	0.62	0.62
Denmark	0.00	0.00	0.00	0.00	0.00	2.69	2.24	2.24
Ecuador	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.37
Egypt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Estonia	0.00	0.00	16.44	11.98	10.01	11.79	9.78	9.78
Finland	0.00	0.00	0.00	0.00	0.00	2.86	4.75	4.75
France	0.65	0.48	0.97	1.41	1.77	2.81	2.43	2.52
Germany	2.61	1.54	0.52	2.49	2.56	2.37	2.28	2.52
Greece	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27
Hong Kong	0.00	0.00	11.62	10.65	7.19	7.58	6.29	5.39
India	0.23	0.21	0.43	0.26	0.25	0.33	0.33	0.34
Indonesia	0.00	0.24	0.49	0.29	0.24	0.17	0.17	0.17
Ireland	0.00	0.00	0.00	3.19	2.65	7.75	7.72	9.01
Israel	10.07	10.78	12.04	12.10	14.22	19.97	15.88	17.26
Italy	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.22
Japan	0.00	0.50	0.34	0.50	0.42	0.38	0.32	0.37
Liechtenstein	0.00	0.00	0.00	0.00	0.00	0.00	167.78	167.78
Lithuania	0.00	0.00	7.80	5.70	4.76	2.81	4.66	4.66
Luxembourg	0.00	52.50	70.35	25.26	20.82	12.17	10.10	10.10
Malaysia	0.00	0.00	0.00	0.00	0.00	0.23	0.19	0.19
Malta	0.00	65.86	0.00	0.00	0.00	0.00	0.00	0.00
Mexico	0.00	0.00	0.00	0.00	0.11	0.37	0.41	0.41
Netherlands	2.53	3.70	0.00	1.83	2.28	2.25	2.61	2.61
Nigeria	0.00	0.16	0.00	0.00	0.00	0.04	0.03	0.03
Norway	0.00	0.00	0.00	0.00	0.00	5.83	4.84	4.84
Philippines	0.00	0.00	0.00	0.14	0.12	0.14	0.11	0.06
Portugal	0.00	0.00	6.36	1.55	0.00	0.00	0.00	0.00
Russia	0.30	0.00	0.15	0.00	0.00	0.00	0.00	0.00
Saudi Arabia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18
Senegal	0.00	0.00	0.00	0.00	0.00	0.46	0.38	0.38
Seychelles	0.00	0.00	0.00	0.00	0.00	0.00	55.04	110.08
Singapore	23.03	5.66	15.29	8.40	7.33	16.93	16.39	18.73
South Africa	0.00	1.11	0.00	0.54	0.45	0.27	0.22	0.11
South Korea	1.68	1.86	4.63	3.07	2.83	1.69	1.92	1.92
Spain	0.00	0.00	0.93	0.67	0.56	0.67	0.69	0.69
Sweden	8.68	3.14	8.49	4.62	3.84	4.55	4.40	3.78
Switzerland	0.00	7.50	7.63	7.38	7.65	3.62	4.51	3.76

Thailand	0.00	0.00	0.00	0.00	0.00	0.22	0.28	0.28
Turkey	0.00	0.00	0.26	0.00	0.00	0.19	0.23	0.23
Ukraine	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00
United Arab Emirates	4.79	3.49	2.37	3.43	2.85	2.53	2.10	3.49
United Kingdom	5.25	6.24	4.89	5.94	5.57	4.63	4.93	5.22
United States	13.32	11.33	8.30	11.29	11.68	12.19	12.89	13.01
Uruguay	0.00	0.00	0.00	4.64	3.89	0.00	0.00	0.00
Vietnam	0.00	0.00	0.00	0.00	0.00	0.16	0.13	0.13
World	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Notes: The unicorn data was gathered from Fortune and CB Insights. Countries that had no unicorn at any point in the period studied (2016, 2018-2023), are not included in this table. As population data for 2023 were not yet released at writing, the location quotients for 2023 are calculated based on the 2022 population data.

Table A4. Unicorns per 10 million inhabitants per country, 2016 and 2018-2024.

	2016	2018	2019	2020	2021	2022	2023	2024
Argentina	0.00	0.00	0.22	0.00	0.00	0.22	0.22	0.22
Australia	0.00	0.40	1.18	0.78	1.17	2.31	3.08	3.46
Austria	0.00	0.00	0.00	0.00	0.00	2.21	2.21	2.21
Belgium	0.00	0.00	1.74	0.00	0.86	2.57	2.57	2.57
Bermuda	0.00	0.00	0.00	0.00	156.83	157.40	157.40	157.40
Brazil	0.05	0.05	0.05	0.33	0.51	0.70	0.74	0.79
Canada	0.55	0.27	0.53	0.53	0.78	4.37	5.14	5.39
Cayman Islands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	145.55
Chile	0.00	0.00	0.53	0.00	0.00	1.02	1.02	1.02
China	0.27	0.50	0.85	0.84	0.98	1.18	1.22	1.20
Colombia	0.00	0.20	0.20	0.39	0.39	0.39	0.58	0.58
Croatia	0.00	0.00	0.00	2.47	2.58	2.59	5.19	5.19
Czech Republic	0.95	0.94	0.00	0.00	0.00	0.94	0.94	0.94
Denmark	0.00	0.00	0.00	0.00	0.00	3.39	3.39	3.39
Ecuador	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.56
Egypt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Estonia	0.00	0.00	7.54	7.52	7.51	14.83	14.83	14.83
Finland	0.00	0.00	0.00	0.00	0.00	3.60	7.20	7.20
France	0.15	0.15	0.45	0.89	1.33	3.53	3.68	3.83
Germany	0.61	0.48	0.24	1.56	1.92	2.98	3.46	3.82
Greece	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.92
Hong Kong	0.00	0.00	5.33	6.68	5.40	9.53	9.53	8.17
India	0.05	0.07	0.20	0.16	0.18	0.42	0.49	0.51
Indonesia	0.00	0.07	0.22	0.18	0.18	0.22	0.25	0.25
Ireland	0.00	0.00	0.00	2.01	1.99	9.75	11.70	13.65
Israel	2.34	3.38	5.52	7.60	10.67	25.11	24.06	26.16
Italy	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.34
Japan	0.00	0.16	0.16	0.32	0.32	0.48	0.48	0.56
Liechtenstein	0.00	0.00	0.00	0.00	0.00	0.00	254.28	254.28
Lithuania	0.00	0.00	3.58	3.58	3.57	3.53	7.06	7.06

Luxembourg	0.00	16.45	32.26	15.86	15.62	15.31	15.31	15.31
Malaysia	0.00	0.00	0.00	0.00	0.00	0.29	0.29	0.29
Malta	0.00	20.63	0.00	0.00	0.00	0.00	0.00	0.00
Mexico	0.00	0.00	0.00	0.00	0.08	0.47	0.63	0.63
Netherlands	0.59	1.16	0.00	1.15	1.71	2.82	3.95	3.95
Nigeria	0.00	0.05	0.00	0.00	0.00	0.05	0.05	0.05
Norway	0.00	0.00	0.00	0.00	0.00	7.33	7.33	7.33
Philippines	0.00	0.00	0.00	0.09	0.09	0.17	0.17	0.09
Portugal	0.00	0.00	2.92	0.97	0.00	0.00	0.00	0.00
Russia	0.07	0.00	0.07	0.00	0.00	0.00	0.00	0.00
Saudi Arabia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27
Senegal	0.00	0.00	0.00	0.00	0.00	0.58	0.58	0.58
Seychelles	0.00	0.00	0.00	0.00	0.00	0.00	83.42	166.84
Singapore	5.35	1.77	7.01	5.28	5.50	21.29	24.84	28.38
South Africa	0.00	0.35	0.00	0.34	0.34	0.33	0.33	0.17
South Korea	0.39	0.58	2.12	1.93	2.13	2.13	2.91	2.91
Spain	0.00	0.00	0.42	0.42	0.42	0.84	1.05	1.05
Sweden	2.02	0.98	3.89	2.90	2.88	5.72	6.67	5.72
Switzerland	0.00	2.35	3.50	4.63	5.74	4.56	6.84	5.70
Thailand	0.00	0.00	0.00	0.00	0.00	0.28	0.42	0.42
Turkey	0.00	0.00	0.12	0.00	0.00	0.24	0.35	0.35
Ukraine	0.00	0.00	0.45	0.00	0.00	0.00	0.00	0.00
United Arab Emirates	1.11	1.09	1.09	2.15	2.14	3.18	3.18	5.30
United Kingdom	1.22	1.96	2.24	3.73	4.18	5.82	7.47	7.91
United States	3.10	3.55	3.81	7.09	8.76	15.33	19.53	19.71
Uruguay	0.00	0.00	0.00	2.92	2.92	0.00	0.00	0.00
Vietnam	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.20
World	0,23	0,31	0,46	0,63	0,75	1,26	1,52	1,55

Notes: The unicorn data was gathered from Fortune and CB Insights.

Table A5. Unicorn distribution over industries per region (absolute numbers), 2023.

Industry	World	Africa	Asia	Oceania	Europe	Latin America and Caribbean	USA and Canada	Emerging economies	Emerging economies (excluding China)
Artificial Intelligence	90	0	25	0	7	3	55	20	1
Auto & transportation	37	0	19	0	8	0	10	19	2
Consumer & retail	31	1	12	0	3	1	14	11	3
Cybersecurity	58	0	8	0	2	0	48	1	0
Data management & analytics	45	0	4	0	6	0	35	3	1
E-commerce & direct-to-consumer	109	0	57	1	16	7	28	56	27
Edtech	32	0	20	0	2	0	10	19	7
Fintech	252	3	43	2	53	14	137	46	39
Hardware	40	0	20	0	5	0	15	18	0
Health	96	0	14	0	9	0	73	12	2

Internet software & services	228	0	36	5	19	0	168	29	14
Mobile & telecommunications	40	1	21	0	4	1	13	18	5
Other	66	0	14	0	14	2	36	10	4
Supply chain, logistics, & delivery	67	0	28	0	8	4	27	26	14
Travel	14	0	7	0	5	0	2	5	2
Total	1205	5	328	8	161	32	671	293	121

Data source: CB Insights.

Table A6. Unicorn distribution over industries per region (percentages), 2023.

Industry	World	Africa	Asia	Oceania	Europe	Latin America and Caribbean	USA and Canada	Emerging economies	Emerging economies (excluding China)
Artificial Intelligence	7.5%	0.0%	7.6%	0.0%	4.3%	9.4%	8.2%	6.8%	0.8%
Auto & transportation	3.1%	0.0%	5.8%	0.0%	5.0%	0.0%	1.5%	6.5%	1.7%
Consumer & retail	2.6%	20.0%	3.7%	0.0%	1.9%	3.1%	2.1%	3.8%	2.5%
Cybersecurity	4.8%	0.0%	2.4%	0.0%	1.2%	0.0%	7.2%	0.3%	0.0%
Data management & analytics	3.7%	0.0%	1.2%	0.0%	3.7%	0.0%	5.2%	1.0%	0.8%
E-commerce & direct-to-consumer	9.0%	0.0%	17.4%	12.5%	9.9%	21.9%	4.2%	19.1%	22.3%
Edtech	2.7%	0.0%	6.1%	0.0%	1.2%	0.0%	1.5%	6.5%	5.8%
Fintech	20.9%	60.0%	13.1%	25.0%	32.9%	43.8%	20.4%	15.7%	32.2%
Hardware	3.3%	0.0%	6.1%	0.0%	3.1%	0.0%	2.2%	6.1%	0.0%
Health	8.0%	0.0%	4.3%	0.0%	5.6%	0.0%	10.9%	4.1%	1.7%
Internet software & services	18.9%	0.0%	11.0%	62.5%	11.8%	0.0%	25.0%	9.9%	11.6%
Mobile & telecommunications	3.3%	20.0%	6.4%	0.0%	2.5%	3.1%	1.9%	6.1%	4.1%
Other	5.5%	0.0%	4.3%	0.0%	8.7%	6.3%	5.4%	3.4%	3.3%
Supply chain. logistics. & delivery	5.6%	0.0%	8.5%	0.0%	5.0%	12.5%	4.0%	8.9%	11.6%
Travel	1.2%	0.0%	2.1%	0.0%	3.1%	0.0%	0.3%	1.7%	1.7%

Data source: CB Insights.

Table A7. Share of worldwide unicorn population per industry and region, 2023.

Industry	Africa	Asia	Oceania	Europe	Latin America and Caribbean	USA and Canada	Emerging economies	Emerging economies (excluding China)
Artificial Intelligence	0.0%	27.8%	0.0%	7.8%	3.3%	61.1%	22.2%	1.1%
Auto & transportation	0.0%	51.4%	0.0%	21.6%	0.0%	27.0%	51.4%	5.4%
Consumer & retail	3.2%	38.7%	0.0%	9.7%	3.2%	45.2%	35.5%	9.7%
Cybersecurity	0.0%	13.8%	0.0%	3.4%	0.0%	82.8%	1.7%	0.0%
Data management & analytics	0.0%	8.9%	0.0%	13.3%	0.0%	77.8%	6.7%	2.2%
E-commerce & direct-to-consumer	0.0%	52.3%	0.9%	14.7%	6.4%	25.7%	51.4%	24.8%
Edtech	0.0%	62.5%	0.0%	6.3%	0.0%	31.3%	59.4%	21.9%
Fintech	1.2%	17.1%	0.8%	21.0%	5.6%	54.4%	18.3%	15.5%
Hardware	0.0%	50.0%	0.0%	12.5%	0.0%	37.5%	45.0%	0.0%

Health	0.0%	14.6%	0.0%	9.4%	0.0%	76.0%	12.5%	2.1%
Internet software & services	0.0%	15.8%	2.2%	8.3%	0.0%	73.7%	12.7%	6.1%
Mobile & telecommunications	2.5%	52.5%	0.0%	10.0%	2.5%	32.5%	45.0%	12.5%
Other	0.0%	21.2%	0.0%	21.2%	3.0%	54.5%	15.2%	6.1%
Supply chain. logistics. & delivery	0.0%	41.8%	0.0%	11.9%	6.0%	40.3%	38.8%	20.9%
Travel	0.0%	50.0%	0.0%	35.7%	0.0%	14.3%	35.7%	14.3%
Total	0.4%	27.2%	0.7%	13.4%	2.7%	55.7%	24.3%	10.0%

Data source: CB Insights.

References

- Andonova, V., García, J., & Andrés, G. A. (2021). What Unicorns Say About Emerging Markets and the Respective Entrepreneurial Ecosystems: Three Cases from Latin America. In L. Casanova & A. Miroux (Red.), *Emerging Market Multinationals Report 2020: 10 Years That Changed Emerging Markets* (pp. 155-163). Cornell University.
- Arnold, D. J., & Quelch, J. A. (1998). New Strategies in Emerging Markets. *MIT Sloan Management Review*. <https://sloanreview.mit.edu/article/new-strategies-in-emerging-markets/>
- Audretsch, D. B. (2021). Have we oversold the Silicon Valley model of entrepreneurship? *Small Business Economics*, 56(2), 849-856. <https://doi.org/10.1007/s11187-019-00272-4>
- Audretsch, D. B., & Fiedler, A. (2023). Does the entrepreneurial state crowd out entrepreneurship? *Small Business Economics*, 60(2), 573-589. <https://doi.org/10.1007/s11187-022-00604-x>
- Balachandran, M. (2021, juni 7). Moglix: How Rahul Garg Built An Unexpected Unicorn. *Forbes India*. <https://www.forbesindia.com/article/startups/moglix-how-rahul-garg-built-an-unexpected-unicorn/68373/1>
- Bosma, N., & Stam, E. (2012). *Local Policies for High-Employment Growth Enterprises*. https://www.oecd.org/cfe/leed/Bosma-Stam_high-growth%20policies.pdf
- Breznitz, D. (2007). *Innovation and the State: Political Choice and Strategies for Growth in Israel, Taiwan, and Ireland*. Yale University Press.
- Breznitz, D. (2021). *Innovation in Real Places: Strategies for Prosperity in an Unforgiving World*. Oxford University Press.
- Bruton, G. D., Ahlstrom, D., & Chen, J. (2021). China has emerged as an aspirant economy. *Asia Pacific Journal of Management*, 38(1), 1-15. <https://doi.org/10.1007/s10490-018-9638-0>
- Cheang, B. (2022). What Can Industrial Policy Do? Evidence from Singapore. *The Review of Austrian Economics*. <https://doi.org/10.1007/s11138-022-00589-6>
- Christensen, C. M., Ojomo, E., Gay, G. D., & Auerswald, P. E. (2018). The Third Answer: How Market-Creating Innovation Drives Economic Growth and Development. *Innovations: Technology, Governance, Globalization*, 12(3-4), 10-26. https://doi.org/10.1162/inov_a_00272
- Davydova, D., Fahlenbrach, R., Sanz, L., & Stulz, R. M. (2022). *The Unicorn Puzzle* (Working Paper 30604). National Bureau of Economic Research. <https://doi.org/10.3386/w30604>
- De la Tour, A., Soussan, P., Harlé, N., Chevalier, R., & Duportet, X. (2017). *From tech to deep tech. Fostering collaboration between corporates and startups*. Boston Consulting Group & Hello Tomorrow.
- Demirgüç-Kunt, A., Klapper, L. F., Singer, D., & van Oudheusden, P. (2015). *The Global Findex Database 2014: Measuring Financial Inclusion Around the World* (SSRN Scholarly Paper 2594973). <https://papers.ssrn.com/abstract=2594973>
- Dilli, S., Elert, N., & Herrmann, A. M. (2018). Varieties of entrepreneurship: exploring the institutional foundations of different entrepreneurship types through 'Varieties-of-Capitalism' arguments. *Small Business Economics*, 51, 293-320.
- Du, J., & Temouri, Y. (2015). High-growth firms and productivity: Evidence from the United Kingdom. *Small Business Economics*, 44(1), 123-143. <https://doi.org/10.1007/s11187-014-9584-2>
- Feferman, F. (2022). The Brazilian innovation ecosystem takes off. In J. S. Engel (Red.), *Clusters of Innovation in the Age of Disruption* (pp. 374-418). Edward Elgar Publishing.
- Giardino, P. L., Delladio, S., Baiocco, S., & Caputo, A. (2023). Beyond myth: a systematic literature review on the emergence of unicorn firms. *Journal of Small Business and Enterprise Development*, 30(6), 1156-1177.
- Gornall, W., & Strebulaev, I. A. (2020). Squaring venture capital valuations with reality. *Journal of Financial Economics*, 135(1), 120-143. <https://doi.org/10.1016/j.jfineco.2018.04.015>
- Hall, P. A., & Soskice, D. (2001). *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*. Oxford University Press.
- Haltiwanger, J., Jarmin, R. S., Kulick, R., & Miranda, J. (2017). *High Growth Young Firms: Contribution to Job Growth, Revenue Growth and Productivity*. 73.
- Henrekson, M., & Johansson, D. (2010). Gazelles as job creators: A survey and interpretation of the evidence. *Small Business Economics*, 35(2), 227-244. <https://doi.org/10.1007/s11187-009-9172-z>
- Herrmann, A. M. (2019). A plea for varieties of entrepreneurship. *Small Business Economics*, 52(2), 331-343. <https://doi.org/10.1007/s11187-018-0093-6>
- Isenberg, D. J. (2010). How to Start an Entrepreneurial Revolution. *Harvard Business Review*, 12.
- Khanna, T. (2022). *Science-based Entrepreneurship in India: A Policy Glass (as yet) Quarter-Full*. <https://policycommons.net/artifacts/2609634/science-based-entrepreneurship-in-india/3632150/>

- Klingler-Vidra, R., Kenney, M., & Breznitz, D. (2016). Policies for financing entrepreneurship through venture capital: Learning from the successes of Israel and Taiwan. *International Journal of Innovation and Regional Development*, 7(3), 203. <https://doi.org/10.1504/IJIRD.2016.079462>
- Kuckertz, A., Scheu, M., & Davidsson, P. (2023). Chasing mythical creatures – A (not-so-sympathetic) critique of entrepreneurship's obsession with unicorn startups. *Journal of Business Venturing Insights*, 19, e00365. <https://doi.org/10.1016/j.jbvi.2022.e00365>
- Kuratko, D. F., Holt, H. L., & Neubert, E. (2020). Blitzscaling: The good, the bad, and the ugly. *Business Horizons*, 63(1), 109-119. <https://doi.org/10.1016/j.bushor.2019.10.002>
- Kwon, D., & Sorenson, O. (2023). The Silicon Valley Syndrome. *Entrepreneurship Theory and Practice*, 47(2), 344-368. <https://doi.org/10.1177/10422587211050892>
- Lee, A. (2013, november 2). Welcome To The Unicorn Club: Learning From Billion-Dollar Startups. *TechCrunch*. <https://techcrunch.com/2013/11/02/welcome-to-the-unicorn-club/>
- Leendertse, J., Schrijvers, M., & Stam, E. (2022). Measure Twice, Cut Once: Entrepreneurial Ecosystem Metrics. *Research Policy*, 51(9), 104336. <https://doi.org/10.1016/j.respol.2021.104336>
- Lehmann, E. E., Schenkenhofer, J., & Wirsching, K. (2019). Hidden champions and unicorns: A question of the context of human capital investment. *Small Business Economics*, 52(2), 359-374. <https://doi.org/10.1007/s11187-018-0096-3>
- Lerner, J. (2009). *Boulevard of broken dreams: Why public efforts to boost entrepreneurship and venture capital have failed and what to do about it*. Princeton University Press.
- Mahroum, S. (2016). *Black Swan Start-ups. Understanding the Rise of Successful Technology Business in Unlikely Places*. Palgrave MacMillan.
- Malkin, A. (2021). *China's Experience in Building a Venture Capital Sector: Four Lessons for Policy Makers* (248; CIGI Papers, pp. i-20). Centre for International Governance Innovation. <https://www.jstor.org/stable/resrep28842.1>
- Mason, C. M., & Brown, R. (2013). Creating good public policy to support high-growth firms. *Small Business Economics*, 40(2), 211-225. <https://doi.org/10.1007/s11187-011-9369-9>
- Mazzucato, M. (2018). *The Value of Everything: Making and Taking in the Global Economy*. Hachette UK.
- Miller, M. M., Gibson, L. J., & Wright, N. G. (1991). Location Quotient: A Basic Tool for Economic Development Analysis. *Economic Development Review, Spring*, 65-68.
- Mocanu, D., & Thiemann, M. (2023). Breeding 'unicorns': Tracing the rise of the European investor state in the European venture capital market. *Competition & Change*, 10245294231204984. <https://doi.org/10.1177/10245294231204984>
- Nkontwana, P., & Stam, E. (2023). *Entrepreneurial Ecosystems for the Africa we want*. https://www.uu.nl/sites/default/files/LEG_USE_WP_23-05.pdf
- Parker, G. G., Alstyne, M. W. V., & Choudary, S. P. (2016). *Platform Revolution: How Networked Markets Are Transforming the Economy and How to Make Them Work for You*. W. W. Norton & Company.
- Poon, T. S.-C., Wu, C.-H., & Liu, M.-C. (2023). Developing entrepreneurial ecosystem: A case of unicorns in China and its innovation policy implications. *Asian Journal of Technology Innovation*, 0(0), 1-17. <https://doi.org/10.1080/19761597.2022.2157849>
- Schrijvers, M., Stam, E., & Bosma, N. (2023). Figuring it out: Configurations of high-performing entrepreneurial ecosystems in Europe. *Regional Studies*, 0(0), 1-15. <https://doi.org/10.1080/00343404.2023.2226727>
- Schrijvers, M., & Vogelaar, J. J. (2023). *The impact of growth: Stakeholder value creation by high-growth firms*. https://scholar.google.com/citations?view_op=view_citation&hl=nl&user=-NfVb-oAAAAJ&citation_for_view=-NfVb-oAAAAJ:2osOgNQ5qMEC
- Schumpeter, J. A. (1934). *The Theory of Economic Development*. Harvard University Press.
- Sittipoonaeagapat, K. (2023, oktober 6). *Rise of Unicorns in Southeast Asia*. Asialink. <https://asialink.unimelb.edu.au/insights/rise-of-unicorns-in-southeast-asia>
- Srnicek, N. (2017). *Platform Capitalism*. John Wiley & Sons.
- Stam, E. (2015). Entrepreneurial Ecosystems and Regional Policy: A Sympathetic Critique. *European Planning Studies*, 23(9), 1759-1769. <https://doi.org/10.1080/09654313.2015.1061484>
- Terjesen, S., Bosma, N., & Stam, E. (2016). Advancing Public Policy for High-Growth, Female, and Social Entrepreneurs. *Public Administration Review*, 76(2), 230-239. <https://doi.org/10.1111/puar.12472>
- Testa, G., Compañó, R., Correia, A., & Rückert, E. (2022). *In search of EU unicorns: What do we know about them?* Joint Research Centre. <https://data.europa.eu/doi/10.2760/843368>
- The World Bank. (2023). *World Development Indicators. Population, total* [dataset]. <https://data.worldbank.org/indicator/SP.POP.TOTL>
- Tiwari, A., Hogan, T., & O'Gorman, C. (2021). The good, the bad, and the ugly of 'Startup India'—A review of

India's entrepreneurship policy. *Economic & Political Weekly (EPW)*, 56(50), Article 50.

Venâncio, A., Picoto, W., & Pinto, I. (2023). Time-to-unicorn and digital entrepreneurial ecosystems. *Technological Forecasting and Social Change*, 190, 122425.
<https://doi.org/10.1016/j.techfore.2023.122425>

Wurth, B., Stam, E. & Spiegel, B. (2022). Toward an Entrepreneurial Ecosystem Research Program. *Entrepreneurship Theory & Practice*. 46.3: 729-778 <https://doi.org/10.1177/1042258721998948>

Zipline. (z.d.). *About | Zipline Drone Delivery & Logistics*. Zipline. Geraadpleegd 2 februari 2024, van <https://www.flyzipline.com/about/>