Determinants of Venture Capital Investments in Tech Start-UPS

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Abstract
Tech start-ups and, especially, unicorns have become a hot topic of today business world. Significant amounts of money have been invested in this sector by venture capital funds in the hope of a good return. However, the criteria and determinants of these investments are fuzzy, and the author has identified a gap in the scientific literature.
Therefore, the objective of the present paper is to discover the determinants of venture capital investments in tech start-ups. Based on a secondary dataset, a multifactorial regression model is proposed that explains the appetence for investment of venture capital funds into tech start-ups. The model shows that the amount of funding in start-ups will increase as the number of unicorns and exits strengthens.

Keywords: entrepreneurship, venture capital, tech start-ups, unicorns, regression model

JEL Classifications: G23, G28, M13, O31.

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Introduction

We are witnessing at a global level and, especially, regionally and nationally, the emergence of a new type of entrepreneurship, related to tech start-ups. These companies do not operate exclusively in the IT area, but represent businesses that use information technology to grow and scale quickly. Thanks to this benefit, tech start-ups have appeared in all industries and in all geographies. Romania is no exception to this global trend, a paradigmatic example being UiPath, the first and, for now, the only Romanian unicorn.

In November 2013 Aileen Lee, founder of Cowboy Ventures, was the first to introduce the term unicorn which is based on disruptive technology. Lee developed the term to describe the rarity of start-ups with a rapidly amassed value — which seemed to be as rare as finding a mythical unicorn. According to Brown and Wiles (2015) the term describes "companies that have always been private, have received at least one funding round of institutional capital, are not a divisional buyout of a public company and have an estimated market value of one billion USD or more".

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Venture capital is the main contributor towards the creation of unicorns. Therefore, our research question refers to the relation between venture funding and the number of unicorns. The scientific literature presents a gap in this field that needs to be filled with additional research. Therefore, after a brief literature review, we will present a regression model that aims to provide an explanation for the appetite of venture capitalists to deploy more funds.

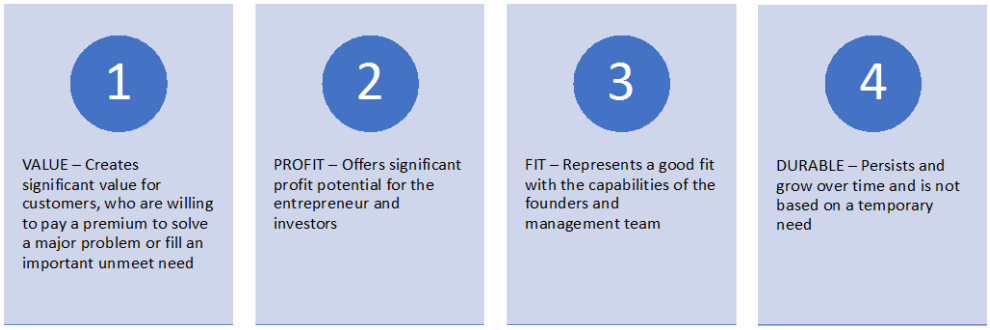
Review of the scientific literature

Even the concept of unicorn is new, we can trace back its origin to the seminal works of Schumpeter (1934). Through the shock and disruption that a unicorn is creating, such companies are a perfect illustration of creative destruction process that shape the market economy. Although Christensen (2006) does not explicitly mention unicorns in his works, the famous theory of disruption can relate to the birth and development of a unicorn.

Following on Schumpeterian ideas, Cowden et al. (2020) argue that unicorns usually compete in existing markets and disrupt them. In the same time, by changing consumer behaviour and leveraging new technologies, they create new markets. For example, Uber is competing in the urban mobility market (taxi services), but the way in which they deliver the product allow them to become a unicorn. In the same paradigm, Netflix didn't invent the movies, but change the way in which we watch movies.

Therefore, the first step in building a unicorn is seizing a valuable business opportunity. Based on the works of different authors, we can summarize the success criteria for a business opportunity in Figure 1.

Figure 1. Success criteria of a business opportunity



Source: author' interpretation after Harvard Business Review Entrepreneur's Handbook

Blue ocean strategy is another seminal concept that can be adapted to the development of a unicorn. Developed by Kim and Mauborgne (2005), blue ocean strategy presents a completely new way of doing business, as presented in Figure 2. Most of the unicorns have drawn their way of working based on these principles, which allows them to re-invent and disrupt old markets, as we see above with the examples of Uber and Netflix. Unicorns can borrow from blue ocean strategy the concept of market creation as opposed to market competing. The authors strongly advise the companies to pursue a **market-creating strategy**, which focuses on generating new markets, instead of staying on **market-competing strategy**, which focuses on beating rivals in existing markets.

Figure 2. Red Ocean vs Blue Ocean strategy

Red ocean strategy	Blue ocean strategy
Compete in **existing** market space	Create **uncontested** market space
Beat the competition	Make the competition **irrelevant**
Exploit **existing** demand	Create and capture **new** demand
Make the value-cost trade-off	**Break** the value-cost trade-off
Align the whole system of a firm's activities with its **strategic choice of differentiation or low cost**	Align the whole system of a firm's activities in **pursuit of differentiation and low cost**

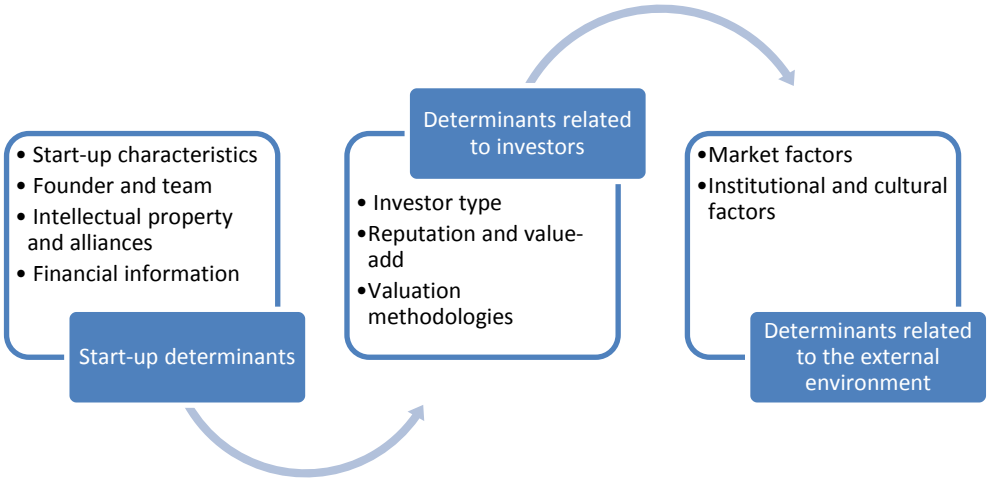
Source: author' interpretation after Blue Ocean Strategy, Expanded Edition: How to Create Uncontested Market Space and Make the Competition Irrelevant, by Kim and Mauborgne (2005)

The concept of the tech entrepreneurship originated in the United States in the late 70's and still today US is the most important market. The industry is structured into several hubs, with Silicon Valley becoming the most famous and aspirational for every entrepreneur in the world. As such, most of the unicorns were born there and still the region is the world leader in terms of number and quality of tech start-ups. However, several authors started to question the Silicon Valley model of entrepreneurship (Audretsch, 2021), while others pointed out to new emerging regions like China and India (Hoffman and Yeh, 2017).

The valuation of tech start-ups and, especially, unicorns have puzzled many authors. The statement made by Vetter (2016) is self-explanatory and does not require further comments – "There are fewer topics more cloaked in mystery, black magic and aspiration than start-up valuation. People regularly speak of inflated valuations – or insane valuations – but it is difficult to know what anchors the numbers".

Therefore, the literature tried to come up with answers and models. Kohn (2018) proposes a multifactorial model based on three determinants: the start-up, the investor and the external environment.

Figure 3. Determinants of start-ups valuation



Source: adapted after Kohn (2018)

Although the model is valid and sheds some lights into start-up valuations, it does not explain the determinants and the appetite of venture capital investors for tech start-ups. It is obvious that a good return (or, at least, the hope it…) drives the investors motivation, but a clear model is missing from the literature.

Research methodology

The analysis will be done using a secondary dataset developed by a reputable global research organization called CB Insights (https://www.cbinsights.com/). This institute specializes in the field of tech start-ups, and, having access to an impressive database, produces global, regional and sectoral reports, statistics and analysis. For this paper, we will use the year-end report 2021 that presents a comprehensive analysis of the state of the ecosystem at global, regional and sectoral level. The tabular dataset attached to the report contains historical series from 2015 to 2021; in some cases, these data are also presented at quarter level, which allowed complex statistical analysis to be carried out. The data set is depicted in Annex 1.

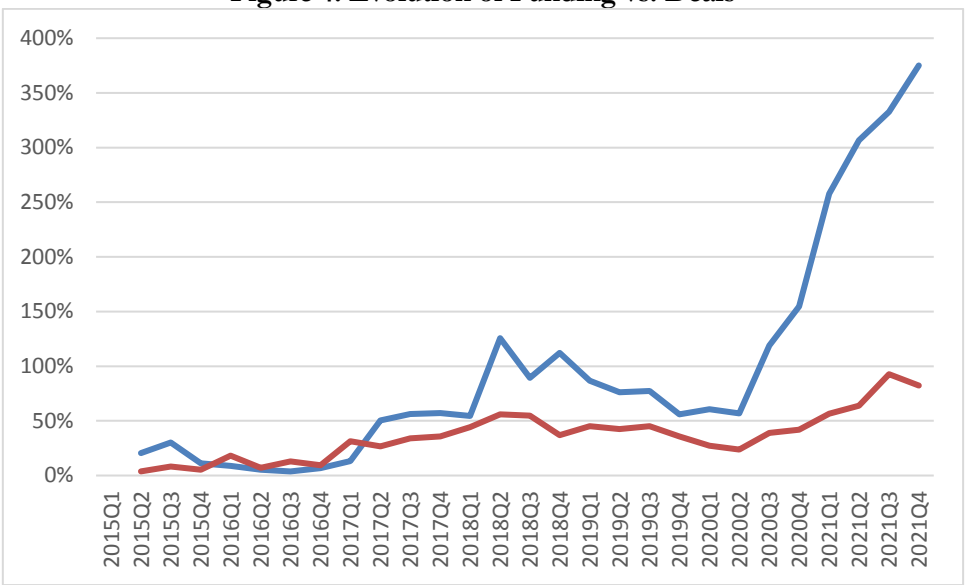
Results and discussions

We will start the discussion with the presentation of the main trends worldwide. The series of analysed data start from Q1/2015 and continue until Q4/2022, comprising the following categories of information:

- Total amount of funding in billions USD (**Funding** variable)
- Total number of completed transactions (**Deals** variable)
- Number of new unicorn companies (valuation over $1 billion) (**New Unicorns** variable)
- Total number of sales/exits from founders' companies (**Exits** variable)

The link between **Funding** and **Deals** is obvious and does not require further comment. It is worth noting, however, that the progression of **Funding** (blue line) is superior to **Deals** (red line), as can be seen in Figure no. 4, which shows a steady increase in the individual value of a transaction. The chart also shows that this trend increased in the second part of 2020, an interval that clearly coincides with the beginning of the Covid-19 pandemic. This suggests that funding rounds are getting bigger and bigger, showing investor confidence in the ecosystem, but also that the pandemic has relocated significant funds to the tech start-up sector. We can therefore say that the pandemic has played a positive role for the global ecosystem.

Figure 4. Evolution of Funding vs. Deals



Any tech entrepreneur dreams of creating a new unicorn. As we indicated in the definition, these are companies that exceed a valuation of over **one billion USD**. Practice shows that after reaching this ceiling, the company either lists on a stock exchange or is acquired by an institutional investor. It is therefore the moment when the founders of the company manage to capitalize on their effort by selling the company or a part of it. In turn, investors are constantly looking for these successful companies, which ensure a superior return on the money invested. The timing of the company's sale is just as important for investors, as they can then turn back into cash the shares held in the start-up. In the absence of an exit from the company, the initial investment does not materialize.

With this in mind, we will test the hypothesis that the **Funding** variable is dependent on the **New Unicorns** and **Exits** variables, in the form of a multifactorial regression model. Using the Eviews 12 program, we obtain the data from Figure no. 5.

Figure 5. Multifactorial regression model

Dependent Variable: FUNDING
Method: Least Squares
Date: 03/14/22 Time: 16:53
Sample: 2015Q1 2021Q4
Included observations: 28

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NEW_UNICORNS	686.8089	72.08296	9.528034	0.0000
EXITS	9.310408	1.994160	4.668837	0.0001
C	-24209.26	11892.83	-2.035617	0.0525

R-squared	0.962315	Mean dependent var	71662.03
Adjusted R-squared	0.959301	S.D. dependent var	38283.91
S.E. of regression	7723.433	Akaike info criterion	20.84286
Sum squared resid	1.49E+09	Schwarz criterion	20.98560
Log likelihood	-288.8001	Hannan-Quinn criter.	20.88650
F-statistic	319.2001	Durbin-Watson stat	1.748198
Prob(F-statistic)	0.000000		

The regression equation is written as:

(Equation 1)

Funding = 686.808867535 * **New Unicorns** + 9.31040803959 * **Exits** - 24209.2577284

To test the validity of the model, we will use first the Durbin-Wats test. It is close to 2, which shows that variables are not self-correlated. The next test is to check the

normal distribution of residual values. Figure no. 6 and in particular the Jarque-Bera test with the associated probability, again confirms the validity of the model. The heteroscedasticity test (Figure no. 7) using the White method shows a probability slightly above 0,05 which, even if it is not significantly higher than this value, does not overturn the validity of the model.

Figure 6. Test of the normal distribution of residual values

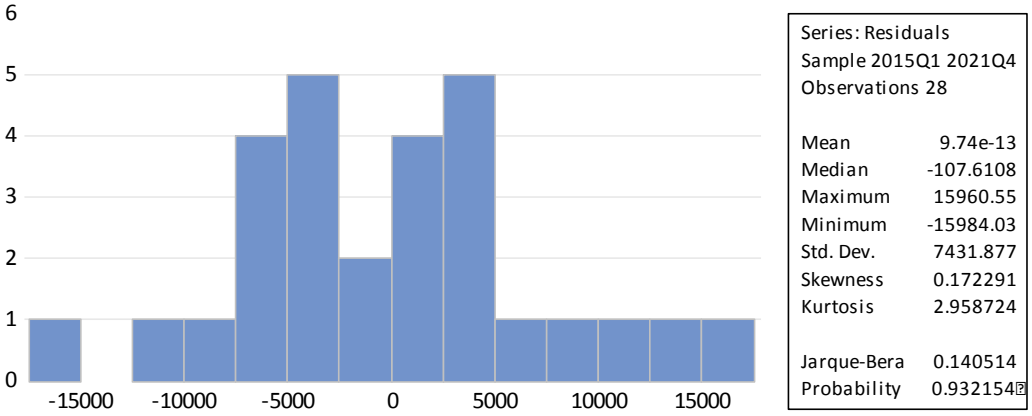


Figure 7. Heteroscedasticity test

Heteroskedasticity Test: White
Null hypothesis: Homoskedasticity

F-statistic	2.350818	Prob. F(5,22)	0.0747
Obs*R-squared	9.750358	Prob. Chi-Square(5)	0.0826
Scaled explained SS	7.612508	Prob. Chi-Square(5)	0.1789

In conclusion, based on the above tests, we can state that the model is valid and can confirm that the **Funding** variable is dependent on the **New Unicorns** and **Exits** variables. As an economic interpretation, the model shows that the amount of funding in start-ups will increase as the number of unicorns and exits strengthens. The parameters of the model also demonstrate that the influence of exits is greater than the number of new unicorns on funding. So, we can say that investors are constantly looking for unicorns, but they are also happy with a profitable exit from a start-up.

Conclusions

Our research reviewed the subject of tech start-ups, one of fastest growing sectors nowadays and, in particular, the subject of unicorns as emblematic companies and the role venture capital in their creation.

Based on the findings from the literature, we proposed a model that correlates the appetite of investors with the birth of new unicorns and profitable exits. Certainly, in practice, there are other variables that have an influence on start-up funding, which is also demonstrated by the parameters of the model. However, we consider that a profitable exit, possibly from a unicorn company, is the main reason for the existence of venture capital funds and their appetence for investment.

The paper has certain limitations as the regression model is valid as a predictor for the future if it evolves into similar coordinates. However, the universe of start-ups is dominated by a high degree of uncertainty, which can completely change the paradigm of a certain field.

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Annex 1

Secondary dataset developed by CB Insights (https://www.cbinsights.com/)

Time	Funding	Deals	New Unicorns	Total Unicorns	Exits	US Funding	US Deals	US Exits	EU Funding	EU Deals	EU Exits	Fintech Funding	Fintech Deals	Retail Tech Funding	Retail Tech Deals
2015Q1	$37,1B	4.982	24	111	5.117	$21,3B	2.492	714	$4,4B	851	330	$3,9B	443	$9,1B	657
2015Q2	$44,8B	5.171	31	140	5.342	$24,3B	2.646	758	$4,6B	796	331	$6,3B	503	$7,7B	704
2015Q3	$48,3B	5.390	34	171	5.595	$23,4B	2.621	714	$5,2B	875	321	$7,8B	545	$10,6B	784
2015Q4	$41,2B	5.241	12	176	5.429	$19,2B	2.425	621	$4,6B	917	299	$4,0B	506	$8,5B	744
2016Q1	$40,4B	5.882	10	183	6.075	$19,6B	2.658	683	$4,5B	1.010	306	$4,7B	642	$6,7B	793
2016Q2	$39,1B	5.332	14	191	5.537	$17,0B	2.403	651	$4,7B	1.054	323	$9,4B	558	$4,0B	727
2016Q3	$38,5B	5.624	13	199	5.836	$19,1B	2.433	596	$3,9B	1.145	406	$5,7B	566	$7,1B	746
2016Q4	$39,6B	5.447	10	204	5.661	$17,5B	2.190	621	$6,2B	1.204	382	$3,7B	550	$8,1B	667
2017Q1	$42,0B	6.538	13	211	6.762	$19,8B	2.665	795	$5,1B	1.573	472	$5,0B	729	$7,3B	792
2017Q2	$55,9B	6.307	23	229	6.559	$29,9B	2.596	708	$7,1B	1.357	519	$7,7B	708	$14,8B	812
2017Q3	$58,0B	6.672	19	243	6.934	$23,7B	2.707	749	$5,8B	1.425	488	$8,8B	736	$11,1B	864
2017Q4	$58,3B	6.770	29	263	7.062	$24,5B	2.559	772	$8,6B	1.496	498	$7,4B	728	$10,7B	860

Time	Funding	Deals	New Unicorns	Total Unicorns	Exits	US Funding	US Deals	US Exits	EU Funding	EU Deals	EU Exits	Fintech Funding	Fintech Deals	Retail Tech Funding	Retail Tech Deals
2018Q1	$57,3B	7.184	25	283	7.492	$26,7B	2.753	800	$7,2B	1.533	496	$8,6B	886	$14,4B	878
2018Q2	$83,8B	7.777	35	301	8.113	$29,0B	2.909	793	$7,2B	1.488	620	$24,2B	888	$12,6B	998
2018Q3	$70,2B	7.710	51	339	8.100	$34,9B	2.807	790	$7,0B	1.396	503	$10,8B	926	$12,2B	954
2018Q4	$78,8B	6.822	46	378	7.246	$43,7B	2.542	867	$6,4B	1.471	600	$9,7B	840	$14,2B	773
2019Q1	$69,3B	7.226	37	410	7.673	$34,0B	2.712	873	$10,7B	1.596	641	$12,9B	940	$17,6B	828
2019Q2	$65,4B	7.106	45	440	7.591	$33,5B	2.783	833	$10,3B	1.568	601	$11,4B	848	$12,1B	884
2019Q3	$65,9B	7.229	40	469	7.738	$33,4B	2.815	832	$9,7B	1.404	545	$11,5B	932	$11,1B	887
2019Q4	$57,9B	6.770	31	492	7.293	$28,2B	2.362	864	$8,9B	1.483	631	$11,8B	822	$8,8B	845
2020Q1	$59,6B	6.337	24	507	6.868	$32,5B	2.550	786	$8,2B	1.411	516	$11,4B	857	$8,9B	806
2020Q2	$58,2B	6.164	26	524	6.714	$31,5B	2.282	580	$8,3B	1.398	490	$11,9B	775	$9,1B	732
2020Q3	$81,3B	6.931	37	538	7.506	$41,6B	2.550	764	$10,3B	1.392	605	$12,9B	853	$11,1B	807
2020Q4	$94,6B	7.068	47	569	7.684	$45,2B	2.591	1.011	$11,8B	1.545	848	$12,7B	1.006	$17,9B	869
2021Q1	$132,8B	7.802	112	657	8.571	$71,0B	2.933	1.217	$20,2B	1.694	911	$27,2B	1.183	$25,0B	932
2021Q2	$150,9B	8.169	142	754	9.065	$71,6B	2.861	1.200	$27,9B	1.876	996	$36,6B	1.224	$30,1B	1.019
2021Q3	$160,7B	9.599	132	856	10.587	$75,7B	3.300	1.251	$23,0B	1.640	941	$32,7B	1.306	$27,4B	1.059
2021Q4	$176,4B	9.077	131	959	10.167	$92,8B	3.187	1.290	$22,1B	1.841	1.049	$34,9B	1.256	$26,6B	1.018

Source: CB Insights (2022), State Of Venture 2021 Report, available at State Of Venture 2021 Report - CB Insights Research, accessed on (20 January 2022)