CORVINUS UNIVERSITY of BUDAPEST

Doctoral School of Business and Management

THESIS SYNOPSIS

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The role of governmental venture capital investors in the startup ecosystem and their investment preferences

PhD. Dissertation

Supervisor:

Dr. Erika Jáki, PhD

Budapest, 2021

Department of Business Finance

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1. Research background and objectives

The creation of innovative startup companies is essential for maintaining the competitiveness of an economy. The financing of these young companies is quite risky however; their investors face many problems due to market failures. Traditionally, companies in this stage of development could only count on personal funds, investments from friends and family, and a small range of institutional investors for financing. However, the market failures present a barrier for venture capital and other institutional investors to participate in the financing of the earliest life-cycle stage (so-called "seed stage") startups. It is globally accepted that national innovation capacity depends to a large extent on the successful creation of start-ups, and thus steps were taken to help alleviate the market failures in this financing segment and to help close the so-called "equity gap" (Wilson et al., 2018). The European Union with its Jeremie program and the government of Hungary with its multiple indirect and direct governmental venture capital programs have been very active in this role, and their large investment activity confirms the importance for research in the topic. Hungary was the leading country of the CEE region in terms of venture capital investment volume in 2018 (Invest Europe, 2019), thanks to a large part to these governmental initiatives. This makes it even more relevant to study governmental venture capital in the context of Hungary.

The aim of my dissertation is to describe the role of the government as an investor in the startup ecosystem, show the reason for governmental intervention, introduce the other ecosystem members and their current situation at the Hungarian startup ecosystem and help identify the qualities that governmental venture capital investors look for in an investment. To this end, the dissertation contains four logically linked chapters to cover all these topics. The structure of the dissertation follows a holistic approach, starting with the big picture and moving toward its elements. First, the startup ecosystem is defined, and its members introduced which is followed by the four researches. The dissertation analyzes state intervention in the venture capital market according to the following breakdown:

- **Purely governmental venture capital**. In this form of intervention, the state invests by having venture capital fund management companies owned by the state that manage equity funds which consist of purely state resources (also known as direct intervention).
- **Public-private partnership venture capital**. Two forms are possible. One form: the state provides part of the resources, which are managed by a private venture capital

fund management company (hybrid financing – indirect intervention). The other form: a governmental fund management company provides public funds together with a private fund management company, which provides private funds at the same time (co-investment) or not at the same time (e.g. first the state invests and then a private investor invests in a later round).

2. Propositions and research questions

The dissertation investigates the startup ecosystem members with a special emphasis on the startup founders themselves and the governmental venture capital investors. The main research questions and propositions examined in the dissertation are presented in detail below.

2.1. Characteristics of the Hungarian startups and startup ecosystem

The main research questions are the following. What are the key characteristics of Hungarian startups in terms of demographics, motivation, challenges, financing, and employment; and how do the characteristics compare to the startups of V4 countries? Which factors do the Hungarian startup ecosystem members deem the most important in a startup ecosystem and how do they rate the Hungarian startup ecosystem along the different characteristics? Are there significant differences between the opinions of the ecosystem members? The main propositions guiding the research are the following.

Proposition 1: The startup ecosystem in Hungary is similar to the startup ecosystem in the other V4 countries in terms of key characteristics.

Proposition 2: The domestic startup ecosystem is considered by ecosystem members to be the strongest in terms of the attributes that are most important to them.

Proposition 3: There are no significant differences of opinion between subgroups of ecosystem members in their assessment of the factors of the Hungarian startup ecosystem.

2.2. Governmental involvement at the venture capital market

The main research questions are the following. What are the main research streams of the governmental venture capital research field? What are the main types of governmental venture capital intervention explored in the literature and how do the researchers evaluate their effects? Which type of governmental intervention is the most justified? What are the

main recommendations for policymakers that the researchers propose? The main propositions guiding the research are the following.

Proposition 4: The interest in the research field between 2000 and 2018 is mainly due to government responses to the various economic crises.

Proposition 5: The articles mainly associate negative effects with direct state intervention.

Proposition 6: The articles equally associate positive and negative effects with public-private partnership venture capital.

2.3. The Hungarian venture capital market and the government

The main research questions are the following. In what forms did the domestic government intervene at the venture capital market? How can we evaluate the indirect intervention that took place, and did it reflect the international best practices? How did the direct intervention evolve through time and how did it answer the COVID-19 epidemic? The main propositions guiding the research are the following.

Proposition 7: The implementation of the Jeremie program followed international best practices.

Proposition 8: The state used direct venture capital intervention in its response to the COVID-19 epidemic.

2.4. What qualities do government-owned venture capital investors seek in a new venture?

The main research questions are the following. What qualities do governmental venture capital investors seek in the target company and how do their preferences vary with respect to the company's life-cycle stage? How do their preferences compare to private sector venture capitalists and business angels? What are their main criticisms of startup business plans? The main propositions guiding the research are the following.

Proposition 9: Governmental venture capitalists analyze the target company's business plans along a different hierarchy of importance than private venture capitalists.

Proposition 10: The venture capital investor's hierarchy is different for startups with different life-cycle phases.

3. Research methodology

In the four researches of the dissertation different methodologies were used that suited their aims and helped to give an encompassing view of the place of the government at the venture capital market and the startup ecosystem. I will go over and show each methodology in detail here.

3.1. Characteristics of the Hungarian startupers and startup ecosystem

In this research we used a survey as the data collection method with the participation of Hungarian startups, venture capital investors, accelerators, incubator houses, corporations, and co-working spaces. The survey ran for a period of one month, from 15th of August to 20th of September 2017. The questionnaire contained multiple-choice and open-ended questions. The aim of the study was to ask the whole population (census method) at the same time. The sampling method used for the survey was nonprobability convenience sampling, where the researcher makes an effort to reveal the whole population of the startup ecosystem and makes them fill out the questionnaire. For reaching the startups, one of the biggest startup databases was used: Crunchbase. The Crunchbase database contained 200 registered Hungarian startup companies in August 2017, to whom our survey was sent. The startup CEOs and founders were invited to participate via e-mail. The survey was completed by 66 startup companies. For reaching the venture capitalists, The Hungarian Private Equity and Venture Capital Association (HVCA) was approached, which represents the interests of the private equity and venture capital sector in Hungary. There were 26 Venture capital investors registered in HVCA at the time of the data collection and 14 of them agreed to fill out the survey. It was also important to reach the Hungarian incubator houses and accelerators. There is no sharp boundary between these two types of supporting entities. We managed to reach almost all the incubator houses and accelerators in Hungary with 25 respondents. There are less than 10 co-working spaces in Hungary, and we managed to reach 3 of them, 2 in Budapest and 1 in Győr. We also managed to reach 4 large corporations involved in the ecosystem, 2 from Szeged, 1 from Győr and 1 from Debrecen.

One goal of this study is to find out who the Hungarian startupers really are, what motivations drove them to the startup scene, what are their biggest challenges and where do they get their financing. It is also useful to look at the job creation potential of Hungarian startups since job creation is often used to justify government intervention at the startup financing market,

which is very prevalent in Hungary. The results were compared with surveys of startup ecosystems in other V4 countries.

On the other hand, the Hungarian startup ecosystem as a whole is of great import, more specifically, it is worth investigating what factors do the ecosystem members deem important in a startup ecosystem and how do they rate the Hungarian ecosystem along these factors. Thus, the respondents were asked to rate the importance of 15 startup ecosystem characteristics on a 1-5 Likert scale, where (1) = not important at all, (2) = of little importance, (3) = of average importance, (4) = very important, and (5) = absolutely essential. They were also asked to rate the characteristics of the Hungarian startup ecosystem on a 1-5 Likert scale, where (1) = very poor, (2) = poor, (3) = acceptable, (4) = good, and (5) = very good.

Likert scales present a set of items that can be used to measure a trait, such as satisfaction, these scales have equally spaced numbers (most typically 1-5) and equally spaced anchors. The Likert scale is also known as an aggregated scale, which means that multiple Likert-type items that measure the same characteristic can be evaluated together in an aggregated form. The consensus among statisticians is that Likert scales can be considered continuous variables for the purposes of analysis, as long as the assumptions of the given analysis method are fulfilled (Harpe, 2015). However, Labovitz (1967) also showed that analyzing Likert-type items that are linear and monotonic can be done with a low associated error. In studies where it is more advantageous to analyze the individual Likert-type items (questions) rather than the combined Likert scale, interval-based statistics are used (Aranyossy et al, 2018).

The sample mean, median, mode and the frequency of (4) and (5) answers, to assess the responses regarding the importance and evaluation of the startup ecosystem characteristics were investigated. Additionally, to be able to determine if the different startup ecosystem subgroups have differing opinions on any of the factors, first a one-way ANOVA test was employed on all the factors to see if there are any significant differences between the sub-groups on a 5% significance level. After this, for the factors that had significant difference among the groups, the Hochberg post-hoc test was employed, which handles samples with different sizes of sub-samples very well, assuming homogeneity of variance between the sub-samples, which we have. This test lets us see exactly which sub-groups have significantly differing opinions regarding the importance and evaluation of the characteristics.

3.2. Governmental involvement at the venture capital market

In this chapter the qualitative systematic literature review was used as methodology. A systematic data collection was performed on 2018.10.31. The search was performed in the following databases: Business Source Complete, Academic Search Complete, Business Source Premier, EconLit and ScienceDirect. The identification process consisted of the following steps. First, a search was run for the term ‘venture capital’ and either ‘government’ or ‘state’ in the title, abstract, or keywords of the published articles. This search generated a list of 128 articles. Second, results were narrowed to only peer-reviewed journal articles written in English. Hence, monographs, Ph.D. theses, working papers, editorial notes, symposia, presentation slides, and book reviews were excluded from the search. Third, all articles were excluded which were not ranked by Scimago. This further narrowed the results to a total of 74 unique articles. Then came the analysis of the abstracts to select only those articles which examine the role of governmental venture capital investors as providers of financial resources. The whole selection process led to 29 relevant articles. Finally, after reading through carefully all the articles, three more papers were excluded since the focus of those articles turned out to be not relevant after all. Most of the works were excluded for not investigating the governmental venture capital actors. In some cases, the articles investigated the corporate venture capital market and the government was mentioned as a legislator. At the end of the process, 26 relevant articles were identified which make up the database.

The research follows the data analysis process of qualitative systematic literature reviews (Paré et al., 2015; Bandara et al., 2011). The chapter aims to give a comprehensive view about the literature on governmental venture capital. To this end, the articles that make up our database are categorized along multiple dimensions. The distribution of articles will be presented over the years, over publishers, over the geographical area where the data was collected, over the used methodology and over the type of used database. After carefully reading through the articles, a common thread was identified that can be properly analyzed with qualitative content analysis. The common thread is that every article contains some results about whether the government intervention at the early-stage venture financing market is successful or not, and in what form. During the qualitative research process, it is essential to capture these sentiments, categorize them and present the results in a systematic way. The analysis uses an inductive approach to content analysis (Mayring, 2004), meaning that first in vivo coding was performed which meant the identification of thought-units in the abstract,

introduction, and conclusion parts of the articles that are conclusions or observations about the role that the governments have played in the early-stage venture financing market. However, in the case of three articles (Wonglimpiyarat, 2011; Cohen et al., 2012; Gill, 2015) other parts of the articles contained the appropriate thought-units due to their different structure. The in-vivo codes or thought-units can be words, parts of sentences, sentences or even multiple sentences that make up a coherent whole. The study takes into consideration also remarks about hybrid funds, government-sponsored incubators, accelerators or other types of early-stage financing vehicles as it is important to get a comprehensive view on the subject, and not just capture data on pure governmental venture capital investors. The chapter also presents captured data on to the authors' recommendations to make governmental early-stage financing initiatives more effective. During the analysis, the in vivo codes are first categorized into emerging categories (Mayring, 2004). After successfully linking every in vivo code to a category, overarching themes and sub-themes were developed. As sub-themes, the relevant type of financing under examination is linked to each category. The categories were further thematized by being positive or negative remarks in the articles or recommendations on governmental intervention at the early-stage venture financing market.

3.3. The Hungarian venture capital market and the government

The employed methodology to evaluate the governmental intervention at the Hungarian venture capital market can be divided into three parts: the methodology used to review the evolution of the domestic venture capital market, the methodology used to evaluate the Jeremie program as the main indirect governmental venture capital intervention in Hungary, and then the methodology used to review the direct interventions of the domestic government in the form of its own fund management companies and managed funds.

For the first part, we collected studies describing the early development of the market, which we supplemented with data from Invest Europe and drew conclusions from it. We opted for this approach because the early evolution was already documented in detail, and by combining this with annual investment data from Invest Europe, the reader can gain a good understanding of the early stages and see that the 2008 financial crisis justified the increase in intervention.

The second part first shows the proceeding of the Jeremie program by collecting the publicly available data attached to the program such as official announcements and later publications

by research institutes. This is followed by collecting and organizing the research done on assessing the program's effects. This section ends with the comparison of the execution of the program with the international best practices that were found in the previous chapter.

The third part aims to investigate the direct venture capital governmental intervention initiatives of the domestic government. This was done by collecting publicly available data from the websites of the Hungarian governmental fund management companies such as size of managed funds, investment policy of managed funds and if available even the size of investments that were carried out. The fund management company SZTA provided the most amount of data on its investments which helped to make a yearly comparison to the aggregate venture capital investments in Hungary to show the yearly proportions of SZTA investments.

3.4. What qualities do government-owned venture capital investors seek in a new venture?

This research uses the verbal protocol analysis methodology. In the sample collected in the spring of 2018, we interviewed nine Hungarian state venture capital investment managers. Three invested into pre-seed stage startups, three into seed stage startups and three into expansion stage startups. They were identified with the help of an insider expert (expert sampling), who was asked to suggest managers from each life-cycle specialization for best representation in terms of demographic characteristics (Horváth & Mitev, 2015). A random sample would be ideal, however due to the private nature of the investors, it was not feasible. Reputation-based sampling is the second-best option for generalizability. These investment managers were generally male, in their middle years, possessing a business or finance master's degree. All are required to be proficient with business plans and company valuation. The pre-seed governmental venture capital investors target startups with only an idea and provide a modest amount of investment. The seed governmental venture capital investors target startups that already started developing the prototype and gathering market feedback, providing a larger investment. The expansion-stage governmental venture capital investors target established startups, which already finished prototype development and have sufficient market feedback, providing a substantial amount of investment.

One aim of this study is to show how the governmental venture capital investment preferences differ across the three types of life-cycle stages. Each verbal protocol interview was an hour long, during which two verbal protocols were completed, which gave us 18 verbal protocol

transcripts to work with. This data collection method provides very rich data, but it is exceptionally time consuming, thus the typical sample size for these studies is small: for a comparison, the size of the sample of Hall and Hofer (1993) was 16 verbal protocol interviews, Zacharakis and Meyer (1995) conducted 4 verbal protocol interviews and Mason and Stark (2004) conducted 9 verbal protocol interviews with venture capitalists. A survey found that the typical sample size of verbal protocols for problem solving studies is between 1 and 20 (Chiu & Shu, 2010), which also confirms that our sample size is on the larger end for this type of methodology. Given that data from governmental venture capital investors is hard to obtain, especially data captured in real-time, important facts can still be learned from this study about governmental venture capital investors even with this limited sample.

Verbal protocol analysis consists of real-time observation during which the researchers record the subject's thinking and decision-making. During the phase of observation and recording, the investment managers read a business plan sent by startup entrepreneurs while articulating their critical thoughts and impressions. Special consideration must be made regarding what business plans will the investment managers evaluate. Giving every participant the same business plans poses some problems. For example, if an investment manager reads the business plan of a startup that doesn't fit his or her industry and life-cycle specialization, then the investment proposal will be rejected outright. Another problem is that business plans provided by the researchers decrease the practical validity of the research. However, if the venture capitalists are asked to read and evaluate business plans that they themselves received, then these problems don't emerge, and the validity of the study is greatly enhanced (Zacharakis & Meyer, 1995). It is evident that giving the investors the same business plans would have increased the comparability of the results, however, the benefits of evaluating actually received, real business plans far outweighs the cost according to Zacharakis and Meyer (1995). Verbal protocol analysis is adept at examining decision scenarios, this study followed the guidelines initially laid out by Ericsson and Simon (1993).

First, the verbal protocol recordings were transcribed. In the transcribed text, so-called 'thought segments' were identified, which can be words, sentence parts, or complete sentences that represent a coherent and distinct thought unit. To arrive at measurable results, each thought segment must be coded into a qualitative property or category, the importance of which we want to measure in the investment decisions. Following in the footsteps of the previous studies (Hall & Hofer, 1993; Mason & Stark, 2004; Robinson, 1987; Zacharakis & Meyer, 1995, 1998), this study uses categories inspired by them, see Table 1.

Table 1: Qualitative properties used as categories

Management	the previous entrepreneurial experience of the management team
	the education of the management team
	the presence of core competencies
Product / Service	the innovational value of the product or service
	the readiness level of the product or service
	the appearance of the product or service
Market	growth potential, scalability
	the saturation of the market, entry barriers
Business plan	the depth of the business plan
	the business plan's level of professionalism
Financials	financial plan (revenue and cost structure, capital expenditures, cash-flows)
	company value
	exit-opportunities

(Source: own editing)

The financials category mainly contains comments about the financial plan part of the business plan, which consists of the planned revenue and cost structure, capital expenditures, and cash-flows. This financial plan is required in all three life-cycle stages. Additionally, it contains the investment manager's speculation about the exit possibilities (i.e.: who might buy this company?), and the possible value of the company (based on mental arithmetic, company valuations are not required in these financial plans).

The analysis employs deductive coding, which means that the range of qualities used as categories can be increased with the discovery of thought segments that don't fit into the predefined categories (Cho & Lee, 2014). Each thought segment was successfully linked to one of the above-defined categories. Following this, the results' frequency tables were created for all three types of governmental venture capital investors (pre-seed, seed, and expansion) in order to see the differences between the most relevant qualities of a startup's business plan across the different life-cycles. The use of frequency tables is a standard practice when conducting verbal protocol analysis to examine investment preferences (Hall & Hofer, 1993; Mason & Stark, 2004; Smith et al., 2010). As all other research methods, verbal protocol analysis has its limitations as well. These include the possibility of frequency counts of thought units not representing completely the importance of the preference criteria, because it is possible that the participant mentions a particular point multiple times due to not being sure about it while he may only mention another point once when he is absolutely sure. Additionally, even though it is a real-time data-collection method, the experiment-like nature of these verbal protocol interviews might also distort the behaviour of the subject (Mason & Stark, 2004).

4. Main results

The main results of our four researches will be presented next.

4.1. Characteristics of the Hungarian startupers and startup ecosystem

The results from the startup ecosystem survey analysis are the following:

1. The Hungarian startupers have similar demographic characteristics to their peers in the other V4 countries, while having slightly more education. There are a number of similarities between the Hungarian startup ecosystem and the startup ecosystem of V4 countries: the concentration of startups in the capital, the percentage of startupers who already participated in a failed startup, the will of startups to enter foreign markets, the size of startups in terms of number of employees, and the sources of funding for the startup (Proposition 1 found support). The Hungarian startupers rated financing as the hardest challenge associated with scaling up. One third of the respondent startups already possess a working prototype, and over half of them have begun to generate sales. While the most often used financing source for starting the company are the founder's own funds, the responding startups primarily seek new funding from venture capital. The least used financing source was crowdfunding, which shows that crowdfunding is not a significant funding method for the Hungarian startup ecosystem. One of the positive externalities of startups that justify the need for governmental venture capital is their job creating potential. The vast majority of the respondent startups indicated that they plan on hiring new employees within 6 months to a year, which confirms the presence of this positive externality at the Hungarian market.

2. The members of the Hungarian startup ecosystem expressed their opinion on which qualities they find the most important in a startup ecosystem and also rated the Hungarian startup ecosystem along those qualities. They find that in terms of the most important qualities the Hungarian startup ecosystem is average (access to funding, access to sufficiently educated workforce, inclination for cooperation among members of the ecosystem) or weak (opportunity to start again after failing a startup). It is alarming to see the opportunity to start again after failing a startup characteristic rated so weak, since in western startup ecosystems the founder of a failed startup is perceived by investors as having more experience and a better likelihood for a successful startup compared to an

untested entrepreneur. This is an area in which the domestic startup ecosystem must improve. Meanwhile, in terms of the least important characteristics the ecosystem is rated the strongest (presence of co-working spaces, startup competitions and social events such as meetups or networking), thus Proposition 2 does not find support. These areas don't require further strengthening. Startupers evaluated access to funding as significantly weaker than incubators and accelerators at the Hungarian market. The representatives of co-working spaces rated the importance of co-working spaces significantly higher than the startupers. Due to these differences in opinions, Proposition 3 is not supported. The members of the Hungarian startup ecosystem rated the general strength of the ecosystem as average (acceptable). These results can help policymakers decide which areas are important for the startup ecosystem members and which areas require further strengthening.

Table 2: Importance of the startup ecosystem characteristics

	Mean	Median	Mode	Std. Deviation	95% confidence interval of mean		Very important (4) and absolutely essential (5) frequency
					Lower	Upper	
Inclination for cooperation among members of the ecosystem	4,42	5	5	0,855	4,250	4,590	87
International relations	4,39	5	5	0,852	4,221	4,559	82
Advanced entrepreneurial culture	4,29	5	5	0,957	4,100	4,480	83
Access to funding	4,25	4,5	5	0,892	4,073	4,427	79
Access to sufficiently educated workforce	4,25	4,5	5	0,947	4,062	4,438	83
Presence of successful startupers in the community as mentors, or angel investors	4,22	5	5	0,970	4,028	4,412	76
Number of high-quality ideas or projects	4,19	4	5	0,907	4,010	4,370	79
Favorable tax environment for entrepreneurs	4,18	4	5	0,968	3,988	4,372	80
Favorable level of required administration for entrepreneurs	4,14	4	5	0,975	3,947	4,333	74
Access to mentors, advisers, coaches	3,93	4	4	1,066	3,718	4,142	73
Access to entrepreneurial education	3,88	4	5	1,225	3,637	4,123	67
Social events (meetups, networking)	3,72	4	3	0,944	3,533	3,907	56
Technology transfer	3,59	4	4	1,065	3,379	3,801	55
Presence of co-working spaces	2,97	3	3	1,087	2,754	3,186	29
Startup competitions	2,96	3	3	1,205	2,721	3,199	35

Source: own database

Table 3: Evaluation of the startup ecosystem characteristics

	Mean	Median	Mode	Std. Deviation	95% confidence interval of mean		Good (4) and very good (5) frequency
					Lower	Upper	
Social events (meetups, networking)	3,71	4	4	0,820	3,547	3,873	61

Presence of co-working spaces	3,33	3	3	0,995	3,132	3,528	38
Startup competitions	3,24	3	3	0,911	3,059	3,421	40
Number of high-quality ideas or projects	3,08	3	3	1,079	2,866	3,294	32
Access to mentors, advisers, coaches	3,03	3	3	0,893	2,853	3,207	27
Presence of successful startupers in the community as mentors, or angel investors	2,88	3	3	0,967	2,688	3,072	29
Access to funding	2,87	3	3	1,116	2,649	3,091	30
Inclination for cooperation among members of the ecosystem	2,81	3	3	0,982	2,615	3,005	22
Technology transfer	2,68	3	3	0,898	2,502	2,858	11
Access to sufficiently educated workforce	2,67	3	3	1,035	2,465	2,875	19
International relations	2,61	2	2	0,973	2,417	2,803	18
Access to entrepreneurial education	2,22	2	2	1,021	2,017	2,423	11
Favorable tax environment for entrepreneurs	2,11	2	1	1,024	1,907	2,313	11
Advanced entrepreneurial culture	2,09	2	1	1,083	1,875	2,305	11
Favorable level of required administration for entrepreneurs	1,96	2	1	0,994	1,763	2,157	8
Evaluate the domestic startup ecosystem	2,91	3	3	0,900	2,731	3,089	22

Source: own database

Table 4: Comparison of sub-sample means (ANOVA and Hochberg at α <5%)

	One- Way ANOVA Sig	Sub-group	Sub-sample mean	Sub-group	Sub-sample mean	Hochberg Sig
Importance of the presence of co-working spaces	0,018	investors	2,636	co-working space	4,667	,035
		startups	2,828	co-working space		,036
Importance of a favorable tax environment for entrepreneurs	0,005	startups	4,414	incubators, accelerators	3,583	,003
Evaluation of access to funding at the Hungarian startup ecosystem	0,011	startups	2,586	incubators, accelerators	3,333	,046
Evaluation of access to a sufficiently educated workforce at the Hungarian startup ecosystem	0,030	investors	3,273	corporations	1,500	,030

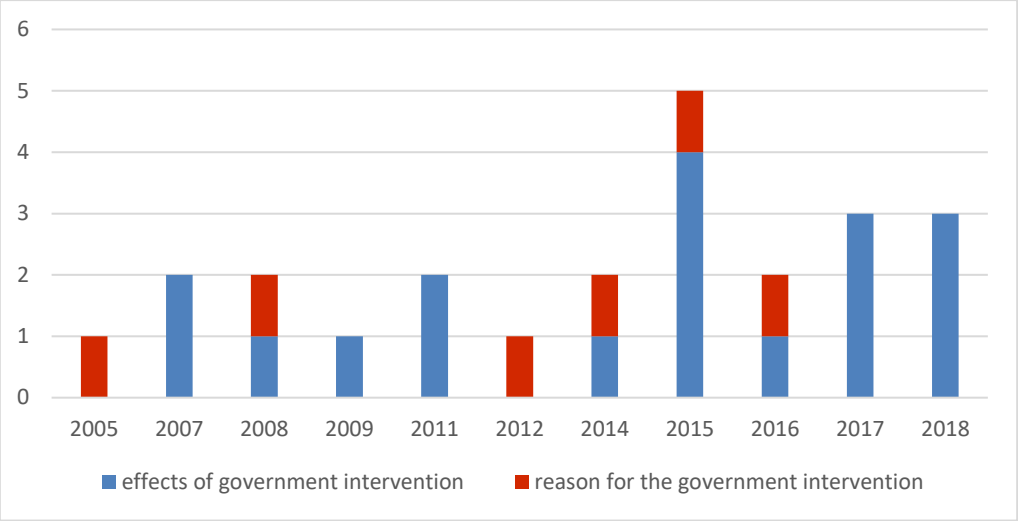
Source: own database

4.2. Governmental involvement at the venture capital market

The following results took shape from the qualitative systematic literature review examining the governmental venture capital research field:

3. Two main research streams can be found in the governmental venture capital research field: investigating the reason for the governmental intervention and exploring the effects of the governmental intervention. After 2008, the latter research stream became dominant in the literature as attention shifted to how different governments responded to the financial crisis (Proposition 4 finds support).

Figure 1: Identified research streams over the years



Source: own editing

The effect of pure governmental venture capital (direct intervention) is a much-debated topic in the literature, the findings vary geographically. While it was found to be inefficient in the EU, evidences from the US, Thailand, Israel, and South Korea show the contrary (thus Proposition 5 does not find support). In particular, authors examining the Israeli programs all agreed that governmental R&D spending complemented the private venture capitalists in the high-tech sector. The pure governmental programs of the UK were also found to be complementary to the private venture capital sector. Only one empirical paper found evidence of crowding out effect by the government, which analyzed data from emerging markets. However, several authors found agency problems linked to EU governmental venture capital programs. Furthermore, studies from all over the world point out that pure governmental venture capital is less efficient than private venture capital. The reason can be a worse ability to select portfolio companies, or the financial only investor nature of pure governmental venture capitalists. It is important to keep in mind that the goal of the government is to fill the equity gap and not to win against private investors in terms of efficiency.

Governmental and private venture capital partnerships are found to have advantages compared to only private venture capital by authors examining worldwide international data and EU data. The positive effects can be linked to the growth of target companies, better selection of target companies and higher likelihood of exits. The effects are more pronounced if the private partner is the lead. However, the governmental and private venture capital partnership programs of the CEE region were criticized for being over-engineered, having a too short set-up period and for lacking thorough evaluation at the end of the program. Overall,

the articles found slightly more positive than negative effects associated with public-private partnership venture capital, thus Proposition 6 is partly supported.

The governmental support for pre-seed companies by financing incubators and business angels was almost exclusively praised by the authors examining its effects. Coincidentally, the intervention to help the riskiest and earliest life-cycle stage startups is the most justifiable type of state intervention. The authors evaluated positively the Israeli high-tech incubator programs for supporting a much wider variety and much riskier pre-seed companies compared to private incubators. The authors agree that private incubators thus cannot substitute for the public ones. With the help of the incubators, governments can entice private investors to invest in firms that they otherwise would find too risky to invest in. The governmental incubator programs of Australia were praised as well. In Portugal, the state supported pre-seed companies by funding business angels to provide them with investments in co-investment scheme.

Table 5: Comparison of identified positive and negative evidences

Theme	**# of positive evidences in vivo codes**	**# of negative evidences in vivo codes**
Governmental venture capital-private venture capital partnership	17	12
Government participation in the pre-seed phase	34	2
Pure Government involvement	24	24
Sum	**75**	**40**

Source: own editing

4. Researchers of governmental venture capital programs have made a number of recommendations, which include the following. Governmental venture capital programs should not compete with each other, they should be accountable, indirect incentives should be used to motivate private venture capitalists, the government should focus on educating the entrepreneurs to improve the demand side of the market, they should let regional institutions handle the allocation of funds meant for regional development. Finally, they need to support target companies throughout their life cycle, which has been highlighted by Israeli researchers as the best means of protecting against foreign investors. This is partly realized in the Hungarian fund management company Hiventures, where pre-seed, seed and expansion-stage startups can all get financing and a startup can start with the pre-seed investment package and later receive the seed and expansion-stage financing round as well. However, even after the expansion stage, further investments are usually needed, where mainly foreign private investors which are large enough can provide the required capital only. Thus, just like the other countries, Hungary must find a

way to fund the later stages of development through its programs. There is also a group of authors who focus their recommendations more on creating incentives for the private sector to benefit from when investing such as investment reliefs and tax reliefs.

4.3. The Hungarian venture capital market and the government

The review of the Hungarian government's indirect and direct intervention at the domestic venture capital market led to the following results:

5. The Hungarian government employed indirect intervention at the domestic venture capital market through the Jeremie program. The program increased the available supply of venture capital and helped to revitalize the market after the 2008 crisis, but its execution was severely criticized by researchers. The program did not succeed in its goal of regional development, nor in financing the early-stage companies that needed the funding the most. The selection process of fund management companies was criticized as was the majority share acquired in target companies by the participating venture capitalists. It was shown that the investments made in the program were less effective at helping the target companies grow than direct governmental venture capital investments. Additionally, the program did not follow international best practices (Proposition 7 does not find support).

6. The Hungarian government employed direct intervention through its various fund management companies and funds. The initial aim of this intervention was to fill the equity financing gap in the earliest life cycle stage where private venture capitalists were reluctant to invest. This was later complemented with the aim of achieving national strategic goals such as regional development and supporting companies that produce other positive externalities. A large part of the governmental direct intervention is performed through MFB Invest, which owns two fund management companies: Hiventures and Focus Ventures (formerly known as Logos Ventures). Focus Ventures manages city funds that invest in companies in a designated city, contributing to regional development. MFB Invest also invested in the Water Impact Fund to promote water efficiency innovations. The investments of the half dozen funds managed by Széchenyi Venture Capital Fund Management contributed greatly to a variety of strategical goals. Since its inception in 2011 it formulated the following goals for its funds: innovation, periphery development, supporting industrial innovation, supporting SMEs with entering

international markets, helping more established SMEs enter the stock exchange and even supporting sustainability.

Table 6: Széchenyi Venture Capital Fund Management Plc. investment activity

Year	2012	2013	2014	2015	2016	2017	2018	2019
Num. of investments made by SZTA	13	17	30	25	11	0	9	6
Volume of investments made by SZTA, thousand EUR	3 110	5 389	15 227	11 939	6 100	0	5 331	4 426
Volume of total venture capital investments in Hungary, thousand EUR (database of Invest Europe)	66 819	18 376	29 902	23 798	28 940	37 837	70 623	120 814
Proportion of SZTA venture capital investments compared to total venture capital investments in Hungary	*4,65%*	*29,32%*	*50,92%*	*50,17%*	*21,08%*	*0,00%*	*7,55%*	*3,66%*

Source: SZTA (2020), Invest Europe (2017), Invest Europe (2020)

Hiventures (known as Corvinus VCFM before 2016) manages the funds of multiple governmental venture capital programs and provides investments to startups in several life-cycle stages. Most recently, governmental direct venture capital intervention also started to help alleviate the negative effects of the COVID-19 pandemic on domestic companies by investing in startups, SMEs and distressed large corporations through Hiventures (Proposition 8 finds support).

4.4. What qualities do government-owned venture capital investors seek in a new venture?

Finally, the verbal protocol analysis used to investigate the investment preferences of governmental venture capital investors revealed the following:

7. First, the results connected to the hierarchy of qualities are the following. When analyzing the business plans of potential investment target companies, governmental venture capital investors seem to value the financials of the target company the most regardless of the life-cycle phase of the company. When analyzing pre-seed phase business plans, they adopt the preferences of angel investors by complementing the financials with the capabilities of the management team among the most valued characteristics in the evaluation process. The rationale behind this is that in this early phase due to a lack of track record of the target company the investor must place a larger

emphasis on the perceived quality of the management team ("investing into people"). However, there is an interesting difference, as the management team only achieved 2nd place here among governmental venture capitalists. This is probably due to the fact that state investors must operate according to predefined financial requirements to handle state sources in the most transparent matter, thus the financial capabilities must always come first in their analysis. This is supported by the findings of the analysis: in every life-cycle stage, governmental venture capital investment managers paid the biggest attention to the financials of the company when evaluating business plans. In the seed branch the second most discussed factor was the market. The management team achieved a low importance in the seed stage, which resembles the results of verbal protocol studies that were investigating private venture capitalists. The difference being that the studies done on private venture capitalists ranked the market as most important and the financials as second most important, while these criteria were found to be valued the other way around by governmental venture capitalists in this study (Proposition 9 finds support). In the expansion life-cycle branch the financials proved to be the most discussed factor, followed by jointly the market and product/service with the same weights. The qualities associated with the construction of the business plan achieved the lowest importance in all three life-cycle stages. On the other hand, it was relatively the most important in the expansion stage, which makes sense since the expansion stage requires the longest and most detailed business plans from applicant startups. Because the preference hierarchy was different across the three life-cycle stages, Proposition 10 finds support.

Table 7: Frequency table of investment preferences based on verbal protocol analysis

Category	*Frequency (%) across the life-cycle stages and total*			
	Pre-seed	Seed	Expansion	**Total**
Financials	25,4%	31,8%	27,5%	**28,4%**
Market	21,9%	25,8%	21,4%	**23,3%**
Product and service	21,9%	23,7%	21,4%	**22,5%**
Management team	23,7%	13,0%	15,4%	**17,5%**
Business plan	7,1%	5,7%	14,3%	**8,2%**

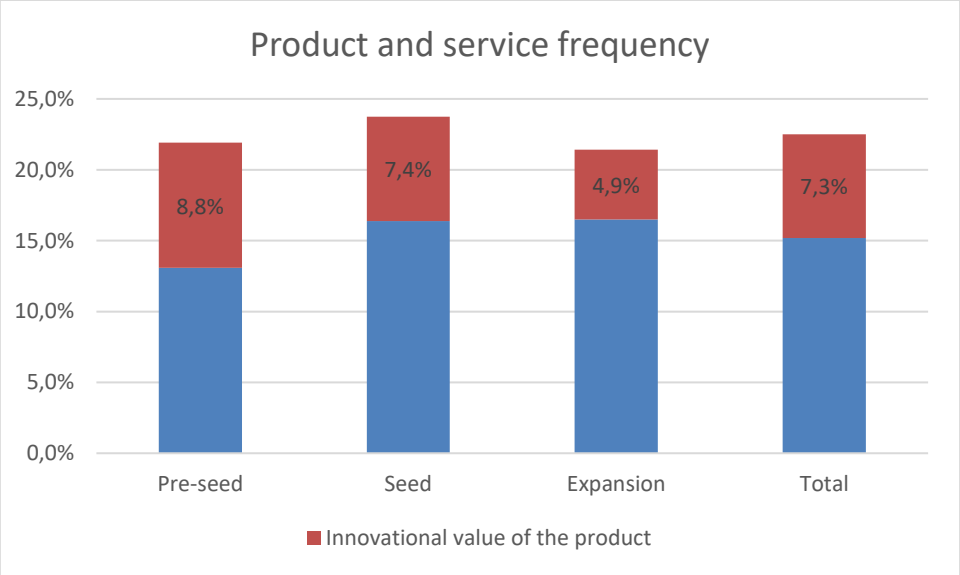
(Source: own database)

It is essential for startups to understand the preferences of governmental venture capital investors if they aim to secure governmental venture capital funding. Furthermore, while the investment preferences of private venture capitalists received much attention in the international literature, there is a lack of similar studies when it comes to governmental investors. This question is even more relevant in Hungary, since the Hungarian venture capital

market currently is driven by governmental venture capital investments thanks to the large investment programs of the state. With the help of this research startups can get the information corresponding to their life-cycle stage.

There is also evidence that governmental venture capitalists place great emphasis on the innovational value of the product or service of the target company, this emphasis is greatest in the pre-seed phase.

Figure 2: The share of innovation related observations within the product and service category based on verbal protocol analysis



(Source: own database)

8. Second, other important observations that emerged during the research are as follows. The governmental venture capital investors are very critical of the received business plans. Startup business plans were heavily criticized for the lack of innovational value, the lack of motivation and commitment in the management team, weak market analysis, and unjustified financial projections. Thus, startupers must place great emphasis on the business plan and construct it expecting a high level of scrutiny. This study provides key takeaways for startupers looking to get governmental venture capital funding. Based on the verbal protocol analysis, we can draw a number of suggestions for startups. They should start the product section of the business plan with the explanation of the problem and the introduction of their product as a solution to this problem. They mustn't try to show their product as perfect, but also show its flaws. They should not merely try to mimic competitors but present solid innovational value. The market demand should be presented in detail. In case of a business-to-business model, the potential partner

companies interested in the solution must be introduced. A market study is appreciated in all three life-cycle stage specializations but is emphasized more for seed and for expansion stage ventures in great detail. The management team must contain all core competencies, and team members holding these competencies must be financially invested in the company by being shareholders, otherwise it would be easy for the competition to lure them away from the startup. The company should not contain silent partner shareholders as they limit the ability to reward the active members. The management team must be able to dedicate most of their time to the startup project if funded. Regarding the financials, scalability is key. Startups also can't plan to generate ad revenues alone, since to be economical that business model would require a disproportionally large user base. The financial projections must be based on publicly available data and all sources should be indicated. The investors also liked to see potential future acquisitors as an exit plan.

5. Conclusion

The goal of this dissertation was to map out the role of governmental venture capital in the startup ecosystem, investigate the state of the Hungarian startup ecosystem and explore the decision making and investment preferences of Hungarian governmental venture capitalists. Hungary – which was the leading country in the CEE region in terms of capital investment based on the total value of venture capital investments in 2018 – proves to be an ideal setting for the study of the startup ecosystem and the role of governmental venture capital within the startup ecosystem. The results of our research help researchers, policymakers, investors and startupers to understand the domestic startup ecosystem better. Based on the research, a possible future research direction is to explore the effects of governmental venture capital but not in the conventional profit-oriented way that is the focus of private investors. In the researches such metrics should be used that can better measure the realization of national strategic objectives and the completion of the governmental intervention's goals, such as employment growth and the financing of companies which can't count on private investors due to market failures. With an appropriate measurement methodology it would be possible to show the true effects of the governmental venture capital intervention and improve the accountability of governmental venture capital programs.

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