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**THE ROLE OF GOVERNMENTAL VENTURE CAPITAL INVESTORS
IN THE STARTUP ECOSYSTEM AND THEIR INVESTMENT
PREFERENCES**

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Doctoral Dissertation

Endre Mihály Molnár

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1 Introduction

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 in this investment segment. 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 aforementioned 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. Governments from around the world realized that their national innovative capabilities depend upon the successful financing of startup companies, and thus started to take measures 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 this 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 research chapters to cover all these topics. The dissertation investigates the startup ecosystem members through the various chapters with a special emphasis on the startup founders themselves and the governmental venture capital investors, for whom the investment preferences are also explored.

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 in Chapter 2. Then the startup founders – the central members of the ecosystem – become the focus of investigation in Chapter 3. In this chapter the demographic attributes and motivation of Hungarian startup founders are explored

along with the scaling strategy, job creation potential and financing of Hungarian startups. The chapter ends by assessing the situation of the Hungarian startup ecosystem. This is achieved by a survey which focuses on the state of the ecosystem and how its members rate its different aspects and most importantly how useful they find these characteristics with respect to the whole ecosystem. All the results in this chapter are compared to similar startup ecosystem studies conducted in the V4 countries in order to put them in context. Finally, the chapter shows the biggest challenges that the Hungarian startup ecosystem faces.

Starting with Chapter 4 the focus of the dissertation shifts to the venture capitalists, specifically governmental venture capital. It is best to start the investigation by synthesizing the international research on the role of the government when it comes to the venture capital markets. This chapter employs the qualitative literature review methodology to perform this analysis. The foundation of the analysis is a database which consists of academic research articles that deal with the efforts of governments around to world to improve venture capital markets. This chapter collects and organizes international results to show how the different governmental programs tackled the problems present at venture capital markets all around the world. The chapter also presents the market failures that are known to justify the entry of the government to this market.

Chapter 5 and 6 brings back the focus of the dissertation to the Hungarian venture capital market, while keeping the broader international questions in mind. Chapter 5 first shows the phases of the early evolution of the Hungarian venture capital market. This is followed by the history of the Hungarian venture capital programs when it comes to indirect intervention, with an emphasis on the Jeremie program. Then the evaluation of the Jeremie program is presented along with a comparison to the international best practices presented in the previous chapter. After this, the governmental direct intervention is explored in detail at the Hungarian venture capital market with respect to the main governmental fund management companies along with their managed funds. The chapter ends with the presentation of the government's efforts to counter the negative effects of the COVID-19 epidemic by launching rescue programs.

Chapter 6 focuses on the investment preferences of governmental venture capital investors. There is evidence in the literature that suggests that governmental venture capital investors might have different investment preferences when it comes to selecting

target companies for investment, which is an idea worth exploring. This question is especially relevant at the Hungarian venture capital market, because of the substantial presence of state investments. The aim of this chapter is to look at the Hungarian venture capital investors to identify their investment preferences and compare them with the already established preferences of private venture capital investors. Both academics and startupers will find this information useful. This study uses verbal protocol analysis as the methodology. This method is able to capture the thought processes of actors real-time, which solves two major problems of previous studies. One of them is recall bias: the investors falsely remember their earlier actions. The other is post-hoc rationalization: they try to justify their actions based on an agenda. These problems were present in studies which employed survey-based or interview-based methods, but real-time methods are not affected by these heuristics. Using verbal protocol analysis, this chapter shows how the governmental investors preferences differ across different life cycle stages of startups. This makes the study even more suited to the Hungarian setting, since the extensive governmental investment presence supports a wide variety of startups in all life cycle stages. The study of this chapter pays special attention to the criticisms of investors on the business plans of startups. Many of the typical mistakes are analyzed along various dimensions which provides startup entrepreneurs looking for venture capital financing with valuable and actionable information. Chapter 7 provides the conclusion to the dissertation and presents additional research opportunities in the topic to be explored.

2 Conceptual framework of the startup ecosystem

To achieve a holistic view of the startup ecosystem, this chapter lays the foundation for the dissertation by defining what a startup ecosystem is, then introducing the principal members of the startup ecosystem. The following chapters will build on this foundation to let us dive deeper into two members of the startup ecosystem: the startupers and the venture capitalists.

2.1 Startup ecosystem definition

As a starting point, the startup ecosystem can be perceived as such a system that supports the creation and development of young “startup” enterprises through both various forms of financing as well as services. There is no exact definition for the startup ecosystem, as the definitions shift from study to study. However, Tripathi et al. (2019) carried out a multi-vocal literature review on articles that deal with startup ecosystems to find a structure of ecosystem definitions. They found four startup ecosystem definitions, from which they generalize that “a startup ecosystem operates in the environment of a specific region. It involves actors that can act as stakeholders, such as entrepreneurs, investors, and other groups of people who have some self-interest in the ecosystem. They collaborate with supporting organizations, such as funding agencies, governments, and educational institutions. They establish organizations to create an infrastructure in which a common network that could support and build startups on a smaller scale is set up, as well as to increase domestic product development and the creation of new jobs in the country on a larger scale” (Tripathi et al., 2019, p. 66).

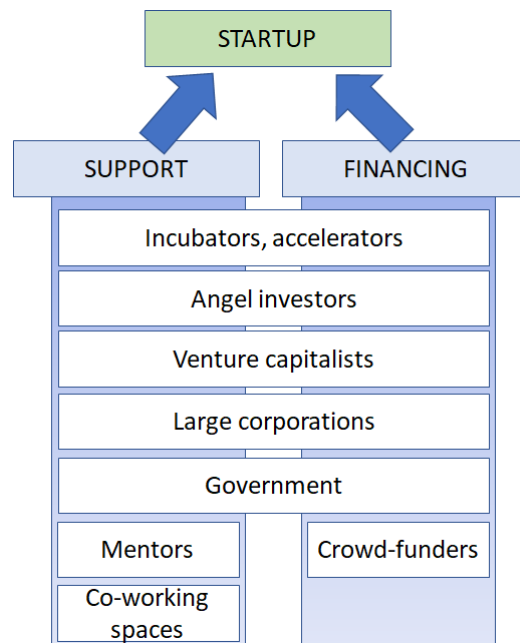
It is also beneficial to dive deeper into the elements of a startup ecosystem. Some common elements were also identified by Tripathi et al. (2019) based on 63 articles: (1) entrepreneur, (2) support factors, (3) finance, (4) demography, (5) market, (6) education, (7) human capital, and (8) technology. The entrepreneur and the startup itself are in the center of the ecosystem, this is persistent in all the definitions. There are also a number of ecosystem members who provide support or financing or both to the startup, which include incubators, accelerators, co-working spaces, mentors, large corporations, venture capitalists, crowd-funding and the government. Banks are also mentioned as possible financiers, but their role is deemed minimal and negligible in the ecosystem. Traditionally banks prefer to provide loans to companies with strong collateral, which startups are not. The authors point out that the definitions contain a

demographic dimension as well, meaning that startup ecosystems are usually confined to a particular country, region or city. They emphasize the target market of a startup as an important element as well. Most startups set their eyes on the global market eventually as target markets, but usually have to start operating on their local markets. Education also plays an important role as well-trained entrepreneurs can influence the growth of the ecosystem. Human capital represents the innate abilities of entrepreneurs such as talent, which would also influence the success of the ecosystem. There is also a connection with the education element, since even the most talented individuals require some form of training to be able to start their business. Finally, technology is mentioned since most startups aim to be “tech” companies, employing cutting-edge technology in order to achieve rapid growth and high scalability. In the next section I take a closer look at the various members of the startup ecosystem which emerged from the literature.

2.2 Startup ecosystem members

As discussed in the previous section, the major members of the startup ecosystem are the following:

Figure 1: Members of the startup ecosystem



Source: own editing based on Tripathi et al. (2019)

The startup ecosystem has many members, each filling a role in supporting or financing the startup companies. My dissertation focuses on the founder of the startup

(the entrepreneur) and the venture capital investor, particularly the governmental venture capitalist. Their features are explored in great detail in later chapters, while I give a brief overview of the other ecosystem actors below.

2.2.1 Entrepreneur and startup

The whole startup ecosystem is centered around the entrepreneur and the startup venture. The entrepreneur is the one who sees an unmet need waiting to be fulfilled and is ready to establish a new company for the creation of a product or service to meet that need. The entrepreneurial team usually consists of only a few members at the start of the project, each bringing skills that are essential to begin the planning of the business and the creation of the product. The entrepreneur must get in contact with a wide variety of other ecosystem-members to succeed however, who will also be presented in this chapter. One of the aims of this dissertation is to uncover more about the entrepreneur such as the motivation for founding the startup, which will be presented later in the form of a study. As the startup company acquires financing, the team usually grows as well.

To get to know the startups, first, we have to define what a startup company is. There are different definitions for startups based on the 2016 V4 reports (Dzurovčinová, 2016; Kollmann et al., 2016; Skala and Kruczkowska, 2016; Staszkievicz and Havliková, 2016) and based on the Digital Success Program created by the Hungarian government (Cabinet Office of the Prime Minister, 2016). The most appropriate definition can be found in the Digital Success Program: “startup means a new company with high growth potential or a project team starting the process of becoming a business and preparing for the entry to the market” (Cabinet Office of the Prime Minister, 2016, p. 22.).

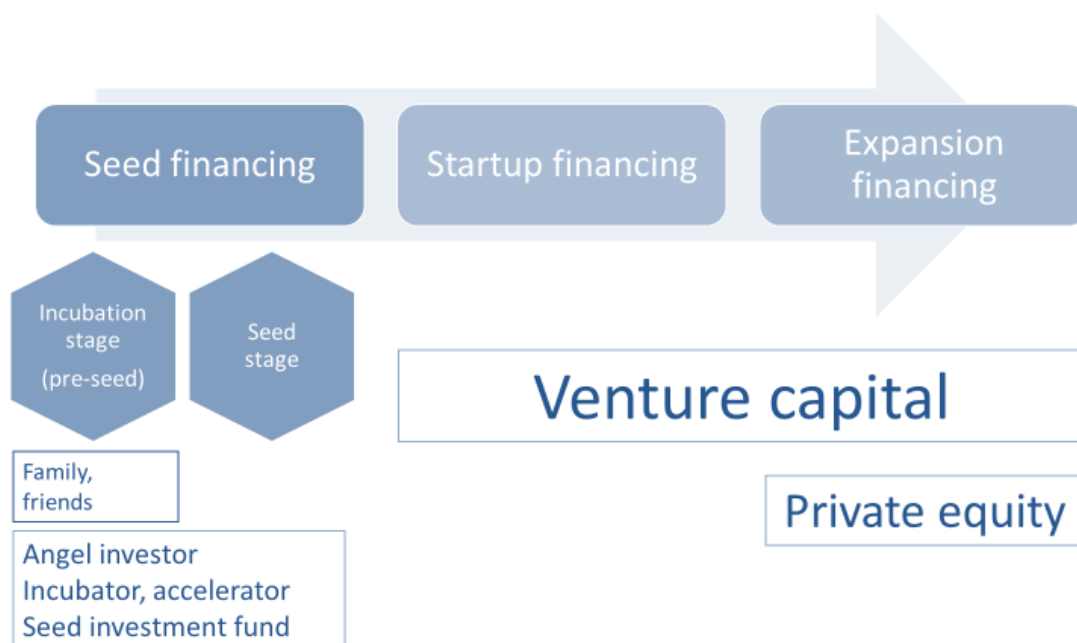
These young companies are very risky, most of them fail in a couple of years. This means that these companies if successful must be expected to do extraordinarily well financially if they ever hope to get financing to compensate for the high risk. This is the reason behind why most of the startup companies operate in the technology sector: it is much easier for a firm with a tech product or service to grow the business while only marginally increasing its costs, because most of them deliver their service through the internet. Thus, an additional customer only increases the costs of the server that is used for delivering the service by a small amount. This property of a business is called scalability and it is highly sought-after by investors of startups.

It's also important to understand the financing cycle of startup companies. According to Berger and Udell (1988), three factors influence the financing opportunities of companies: firm size, firm age, and the availability of information regarding the company. This means that the smallest, youngest firms with the least amount of available information get access to the fewest investors: usually friends and angel investors. As the firm matures and reaches a certain size, it becomes a potential investment target for venture capital and private equity investors. There is no sharp boundary between the stages of the life cycle. In the following, only those stages– start up and seed stage – which are relevant to the current research are presented.

1. The “seed stage enterprises” often possess merely a product/service idea ("idea company"). These companies can be categorized further into the following categories:
 - *Incubation stage* – the R&D stage of creating the product or service. Companies in this stage require only a small amount of financing. In the case of state intervention, the governments usually aim to provide funds to this sector based on a short and quick evaluation process. This stage is often called “pre-seed” as well.
 - *Establishment stage* is when the firm starts to set up their legal framework and operational organization. Investors of these companies are usually business angels, or the 3F (Family, Friends, Fools). In the last decade – due to the EU-Jeremie program – seed funds and accelerators also took part in the financing of these companies.
2. The “Start-up enterprises” have already developed an operational prototype and have some market feedback on the product or service. We can further distinguish the following sub-stages:
 - *Introduction stage*: the company operates but doesn't realize revenues yet. Sales and marketing are the key processes.
 - *Growth stage*: In this stage, the company starts to realize revenues but usually faces negative earnings. These enterprises are beloved targets of traditional private venture capital funds.
 - *Expansion stage enterprises* have an established business but need additional financing for marketing expenses to expand further. Venture capital funds and private equity investors are the typical investors of these

companies. In this stage, less government intervention is needed, so it is out of the focus of this chapter.

Figure 2: Financing stages of startup companies



Source: own editing

Seed and many start-up stage companies do not realize revenues. Most of them have negative earnings and cash flows. These companies work on their idea and create the prototype of the product or make the service available for costumers. The financial resources are needed usually to cover operational costs, like R&D, personal expenses, or marketing costs. Strong marketing activity is needed to boost sales. There are also considerable costs of seeking new investors, including travel expenses, PR costs. In these early stages, enterprises are obviously out of the scope and risk tolerance of commercial banks, so they cannot count on standard bank loans (Sahlman and Scherlis, 2009; Walter, 2014).

2.2.2 *Incubators and accelerators*

There is often confusion surrounding incubators and accelerators as they both provide similar services. Incubators traditionally provided offices for startups, later they started providing business services such as accounting, business planning and legal advice, and lately they even started providing early-stage investments. Accelerators also provide investments; however, they are focused on the rapid growth of the participating startup in a narrow timeframe (as opposed to incubators). Accelerators usually help

startups to achieve this rapid growth by providing them intense training and mentoring in addition to business contacts. Thus, the main differentiating feature between them is the duration and the means of the provided support (Lovas & Riz, 2015).

It is becoming common, that venture capital investors establish accelerators to finance the most promising enterprises with a small investment in return for a small equity share. The successful ones can then apply for the seed fund investment of the venture capitalist. One such accelerator is the SeedStar accelerator of DBH Investment Plc. This accelerator defines itself as both an accelerator and incubator.

Lovas & Riz (2015) conducted a survey with 18 Hungarian incubators/accelerators, of which only 6 identified as accelerators and 12 identified as incubators. The participating incubators and accelerators were the following: Innonet Innovációs és Technológiai Központ, Agora Office Építőipari Inkubátorház, Digital Factory, iCatapult, Innopark, Kitchen Budapest, Lakits Villa, Makói Ipari Park, Marengo Real Estate, Nagykanizsai Inkubátorház és Innovációs Központ, Nógrád Megyei Regionális Vállalkozásfejlesztési Alapítvány, Oxo Labs, Ózdi Vállalkozói Központ és Inkubátor Alapítvány, Paksi Ipari Park, Prinom Vállalkozói Inkubátorház és Innovációs Központ, Rézgombos Szolgáltató és Inkubátorház, Somogy – Flandria Inkubátorház és Vállalkozásszervező, Traction Labs.

Both groups contained non-profit and for-profit institutions. They also found that institutions from both groups provided programs on varying timeframes (from a few months to 5 years), which also contradicts the international view on the main difference between incubators and accelerators.

The National Research, Development and Innovation Office accredited four institutions with the Accredited Technological Incubator title along with a grant (NKFIH, 2013). The winning institutions were the following: iCatapult (Primus Capital), Aquincum, Digital Factory, ACME Labs. These institutions provide an extensive accelerator program as well while being incubators in name, proving how mixed the terminology is in this area. In conclusion, it is very likely that startups will come into contact with incubators or accelerators during their development, and in Hungary these terms can safely be used as synonyms.

2.2.3 *Angel investors*

Angel investors are wealthy individuals who are willing to invest in young firms. Traditionally, their investments were much smaller in size than venture capital, so they

targeted pre-seed and seed stage companies who require less investment. Since their target companies face the highest risk of failure, some angel investors spread their investment around a number of target companies from different sectors to try to diversify this risk. This can lead to angel investors forming a network through which they can listen to entrepreneurs pitching in the hope of investment in an organized setting (Wood et al., 2020).

Evidence also surfaced about a shift in the scope of angel investment to the startup and even the expansion stage. Their participation in expansion-stage investments occur when members of the angel investor group control the target company and the investors are very familiar with the sector. Unlike venture capitalists, angel investors use a soft monitoring system which is more based on personal involvement with the target company, support and building trust (Karsai, 2019).

Indeed, some angel investors are more comfortable focusing only on the sector in which they are experts themselves in order to be able to better select target companies in that sector and potentially even contribute to their growth leveraging their knowledge and connections. Since 2017 the Hungarian Business Angel Network (HUNBAN) gives a structured setting to Hungarian angel investors and entrepreneurs to meet and listen to the entrepreneurial pitches. HUNBAN aims to encompass other CEE angel investors as well to facilitate cross-border deals (HUNBAN, 2020).

2.2.4 Mentors

Mentors are experienced individuals in business who are willing to share their experiences and give advice to startups. Mentors thus must have business experience in the sector that the startup operates in. Mentors can offer this service individually to startups they select, or they can act as part of an organization. These organizations can include mentorship programs, or the other ecosystem members that offer mentoring as part of their service such as accelerators, incubators, angel investors and in some cases even co-working spaces. The services offered by mentors include advising startups in the areas market strategy, growth, funding acquisition and decision-making (Tripathi & Oivo, 2020).

Shimasaki (2020) states that personal one-on-one mentoring is technically free, but the mentee should expect to give back to the mentor by incorporating the advice given and showing the mentor how it improved the business. He also suggests that having multiple mentors can further enhance the growth of the company and the

entrepreneur. The use of formal mentorship programs is also encouraged such as the Venture Mentoring Service, which is a non-profit organization affiliated with the Massachusetts Institute of Technology. A comparable mentoring program was launched in 2019 by the Hungarian government in the framework of the GINOP development program called National Entrepreneurial Mentor Program (Országos Vállalkozói Mentorprogram, OVM), which provides access to an organized network of mentors to Hungarian SMEs with the help of the Foundation for Small Enterprise Economic Development (SEED) for free (OVM, 2020).

2.2.5 Crowd-funding

As financiers of startups, crowd-funding has also gained prominence in the recent years. In this form of financing a large number of individuals (the crowd) provide money to fund a company through a fund-raising campaign orchestrated on a crowd-funding website. There are multiple models of crowd-funding: (1) donation-based, where there is no tangible reward for the funders; (2) loan-based, where the reward is either the finished product or an interest plus principal repayment based on the amount committed; and (3) equity-based, where the funders receive an equity share in the company in exchange for their funds (Paschen, 2017). A key driving factor behind equity-based crowd-funding is the fact that angel investors and venture capitalists started to aim towards later-stage startups after the financial crisis, thus lessening the competition in the earliest stage (Karsai, 2019).

Csepy et al. (2020) analyzed the success factors of crowd-funding campaigns, concluding that the personality and previous crowd-funding experience of the initiator of the campaign, the used communication channels – such as text or video – and the internet-based connections of the initiator are the most important factors. Crowd-funding platforms include: Betterplace, GoFundMe, Crowdfunder (donation-based); Auxmoney, Kiva (loan-based); and MicroVentures, Companisto, Seedmach, Indiegogo, which are equity-based.

2.2.6 Co-working spaces

Co-working spaces are supposed to both provide a physical environment for startups to work in and share experiences or help each other in the process. These are large open office-spaces where startupers can interact and hopefully the interaction between members of different startup teams produces some synergies (Tripathi et al., 2019).

Incubators and accelerators usually also offer co-working spaces for startups in their program. Tripathi and Oivo (2020) suggests that a co-working space must be capable of providing information, knowledge, important resources, and access to social capital to its tenants. Co-working spaces also host startup events to draw the startup's attention to their offerings.

2.2.7 Large corporations

Large corporations are well established with resources but lack the agility that startups have. Startups thus have an advantage when it comes to innovations that large corporations lack. Startups can build their entire operation to develop an innovative business idea, meanwhile it is much harder for a large corporation to mobilize in these directions. It is in the large corporation's interest to help the startup world and try to benefit from its innovations.

Weiblen and Chesbrough (2015) show four models through which this interaction can take place. First, in the corporate venture capital model, the corporations invest in the startup in exchange for an equity share, which allows the corporation insight into and some control over the startup. Second, in the corporate incubation model, the corporation creates spin-off startups from internal ideas that do not fit the core operation of the company perfectly but might generate some profit by further development and sale to an interested party. The other two models do not involve investments in the companies: the outside-in model helps startups to develop solutions that the corporation might make use of in the future, effectively becoming suppliers if successful, while the inside-out model makes it possible for outside parties to create innovations on the platform of the corporation, generating revenue for the corporation (example: app stores).

In Hungary, the Hungarian Chamber of Agriculture in collaboration with Design Terminal organizes the NAK TechLab incubation program starting in August 2020, through which agricultural startups can further develop their products with the help of Hungarian large corporations, such as Auchan, Bonafarm, SIÓ, and Syngenta. The Hungarian energy company MVM Group through its MVM Smart Future Lab program offers startups in the energy sector incubation and investment in exchange for a minority equity share.

2.2.8 *Venture capital fund management companies*

Venture capital fund management companies are financial intermediators, in other words they collect funds and invest them directly into companies. Venture capital firms are the subset of private equity, the main difference being the venture capitalists focus on earlier life cycle stage startups, while private equity is more interested in later-stage companies (Karsai, 2012). Venture capital firms manage funds, which are made available to them for a predefined period by the owners of those funds (usually institutions). They must repay these funds in addition to the realized returns to the fund owners after subtracting the fund management fee. This means that the venture capital fund management company and the managed fund are two separate entities, both have owners that are usually different.

The owners of the fund management company can be private actors or the government, the same is true for the managed fund. The venture capital fund management company invests the money of the fund into target companies. Venture capitalists not only provide financial investment but also their business connections and expertise to target companies. They try to acquire such a share in the target company which provides them control rights, additionally they put their members into the executive and monitoring bodies of the target company. Venture capital investors set their required return such as to compensate for their losses on unsuccessful investments.

Based on interviews with venture capital investors of the domestic market, Karsai estimated their required rate of return to be around 35-50%, and 30-40% in 2002 (Karsai, 1997, 2002). On the other hand, the Széchenyi Fund Management Plc. which is a state-owned investor, requires a 10-20% return from companies with 2 years of operating history. This is due to two factors, one being the lower risk of more mature companies, the other being the generally lower return requirements of governmental investors (SZTA, 2017). The differences between the private and governmental venture capitalists will be elaborated on in more detail in a later chapter.

2.3 Summary

This chapter started the dissertation by first defining the startup ecosystem and examining its elements in the literature. This was followed by a brief description of the members that make up the startup ecosystem. All ecosystem members are interested in the success of the startup companies by either providing services or financing to the startup. The success of the startup is dependent upon making contact with the right

kinds of startup ecosystem members during its evolution. The role of incubators shifted in the course of time, today they not only provide office space for the startups but also business services and investments as well. Accelerators aim to help startups achieve rapid growth in a small timeframe by providing intensive training and network expansion as well as investment. Angel investors were traditionally wealthy individuals who invested small amounts into pre-seed startups. Recently organized angel investor groups emerged that target later staged startups with larger investments in their sector of interest. Finding the right mentor can also play a major role in the success of a startup, who lend their business and sector knowledge to the startups but do not provide investments. Startups can tap into the financing potential of large numbers of individuals through crowd-funding websites, which not only provide equity-based financing, but also loan-based and donation-based as well. Co-working spaces provide a shared office space for startups and facilitate networking between them. Large corporations can also profit from the startup world in several ways. They can appear as investors in startups that innovate in their sector, they can create spin-off companies for ideas that are not directly related to their core operation, they can help startups to mature and become their suppliers, and finally they can encourage other businesses to innovate on their platform where they get a share of the revenue. Venture capital fund management companies manage the funds provided by their investors and they are one of the main sources of institutional investment for startups. Their required return is much larger than the actual realized returns, in order to compensate for failed investments. They are a major focus of the dissertation and will be investigated in more detail in later chapters.

3 Characteristics of the Hungarian startups and startup ecosystem¹

The aim of this exploratory research chapter is to determine the main characteristics of Hungarian startups, and the ecosystem based on a survey approach data collection which took place in 2017. The results are compared with those of similar startup ecosystem studies conducted in V4 countries recently. All startup companies need a supporting ecosystem for rapid development and easy access to global markets, which is usually only available in big cities. Several studies investigate the beneficial factors that encourage the founding of new enterprises. Roman et al. (2018) found a significant correlation between macroeconomic figures (GDP), demographic variables (population growth rate), and the spirit of entrepreneurship. Besides macroeconomic and demographic features, other factors and events can support startup entrepreneurs naturally. According to our survey, actors of the Hungarian startup ecosystem found the following factors to be the strongest ones of the domestic startup ecosystem: community events, co-working offices, startup competitions and the availability of mentors and consultants in Hungary. Likewise, Timilsina et al. (2016) found positive and significant relationships between the business environment, competitiveness, and firm performance. However, they also added, that one should put more emphasis on competitiveness to improve firm performance instead of blaming the business environment.

The most important actors of the Hungarian startup ecosystem are the startup companies themselves. Even though a uniform definition for a startup is missing, in startup ecosystem studies the final selection of startups was based on self-categorization. According to this, only those companies were involved in the surveys, which defined themselves as a startup and they were not investigated further whether they were corresponding to pre-determined definitions. In the survey, investors were represented by the CEOs of the Hungarian venture capital fund management companies.

3.1 Methodology and database

In this research we used a survey as data collection method to reach the Hungarian startups and 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

¹ I carried out this research with Erika Jáki and Béla Kádár, the resulting study was published in *Vezetéstudomány* (Jáki et al, 2019)

questions and SPSS was used for the analysis. 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 (census method). 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 important to reach the Hungarian incubator houses and accelerators as well. 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.

The other aim of this study is to uncover what qualities do the members of the Hungarian startup ecosystem deem the most valuable (RQ6) and how strongly do they feel that these qualities are present in Hungary (RQ8). 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 will be 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. The central tendency measures are showing similar results for the factors in Table 5 and Table 7 which are consistent with the frequency of the (4) and (5) answers.

3.2 Research questions

Since startups are required to be scalable, IT startups secured a leading position among their peers. Thus, it is easy to assume that most startupers come from an IT background, are somewhat lacking in business and finance skills and need help to make their business plan, to secure financing, and to determine their company's value. Nine research questions were formulated (see Table 1) to explore the Hungarian startup ecosystem. In the research, we also compare the characteristics of the startup ecosystem with the startup ecosystems of other V4 countries.

Table 1: Research questions for chapter 3

RQ1: What are the key demographic characteristics of Hungarian startupers?
RQ2: What are the main motivational factors of Hungarian startupers according to the age and gender of startup founders?
RQ3: What do startups consider the main challenges of scaling their company?
RQ4: What is the job creation potential of Hungarian startups?
RQ5: What are the main financial sources that fund Hungarian startups?
RQ6: Which factors do the startup ecosystem members deem the most important in a

startup ecosystem?

RQ7: Are there significant differences between the opinions of the ecosystem member subgroups about the importance of these factors?

RQ8: How do the startup ecosystem members rate the Hungarian startup ecosystem along the different characteristics?

RQ9: Are there significant differences between the opinions of the ecosystem member subgroups about the evaluation of these factors in Hungary?

Source: own editing

One goal of this study is to find out who the Hungarian startups really are, what motivations drove them to the startup scene, what are their biggest challenges and where do they get their financing (RQ1-3, RQ5). 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 (RQ4). 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, what factors do the ecosystem members deem important in a startup ecosystem and how do they rate the Hungarian ecosystem along these factors (RQ6-9). Propositions were also formed along the logic of the investigation (see the table below). The study contains the opinions of venture capital investors, accelerators, incubators, co-working spaces and corporations to help illuminate this topic.

Table 2: Propositions for chapter 3

Proposition 1a: The Hungarian startups are fresh university graduates from Budapest.

Proposition 1b: The main motivation for establishing the startup comes from the profit angle.

Proposition 2a: Hungarian startups consider international expansion as their biggest challenge.

Proposition 2b: Hungarian startups have considerable job-creating potential.

Proposition 2c: Hungarian startups mainly employ venture capital as the main source of financing.

Proposition 2d: The domestic startup ecosystem is similar to the startup ecosystems of other V4 countries in terms of key features

Proposition 3a: Hungarian startup ecosystem members consider access to financing to be the most important characteristic in a startup ecosystem.

Proposition 3b: There are no significant differences between the opinions of the ecosystem member subgroups about the importance of the startup ecosystem factors.

Proposition 4a: Hungarian startup ecosystem members consider access to financing to be the strongest characteristic in the Hungarian startup ecosystem.

Proposition 4b: There are no significant differences between the opinions of the ecosystem member subgroups about the evaluation of the Hungarian startup ecosystem factors.

Source: own editing

3.3 Characteristics of the Hungarian startups

This section aims to answer RQ1: what are the key demographic characteristics of Hungarian startups? Let's look at the startups' characteristics who participated in our survey to try to answer this question. I will be providing comparisons with results of studies carried out in the other Visegrád countries (V4).

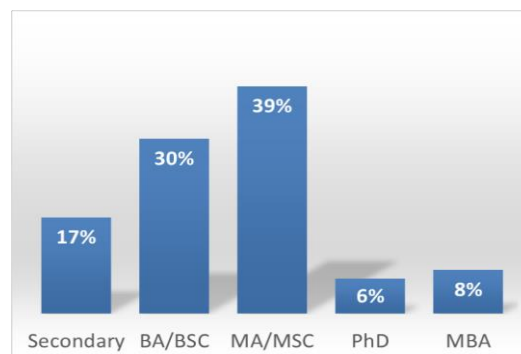
Based on the results of the questionnaire, entrepreneurs of start-up companies were typically between the age of 26-35 (38%) and 36-50 (42%) altogether representing 80% of total startups. As a comparison, in the Czech Republic, Poland and Slovakia the startup founders are usually in their 30's (Beauchamp & Skala, 2017). Only 9% of startups were between the age of 19-25 and 11% were above 50 years. Korosteleva and Mickiewicz (2011) also examined the age distribution of startup entrepreneurs and found that the financial scale of the project increases with the age of the entrepreneur. This finding indicates that higher experience, established reputation, and accumulated savings of older entrepreneurs increase the chance of successfully collecting financial sources.

According to our survey, 86% of startups were male and only 14% female, thus women are heavily underrepresented among the startups. This is, however, an international trend as based on the research of European start-up Monitor from 2016, the ratio of female startup founders is only 14,8% in Europe (Kollmann et al, 2016). Investigating the gender composition further, we can see that in 32% of the cases, at least one female founder was present in the respondent startup teams.

Based on the survey, 83% of the startups have a higher education degree. 53% have a master's degree. In the Czech Republic, Poland and Slovakia, two thirds of the startup founders have at least a higher education degree (Beauchamp & Skala, 2017). Within the segment holding the master's degree, 6,1% also has a Ph.D. degree and 7,6% has an MBA degree. 16,7% of the respondents of startups indicated that they are still a student at a secondary school. In Poland, 13% of the founders have Ph.D. degrees (Skala & Kruckowska, 2016). As can be seen on the following chart, the highest education level of the majority of startups is MA/MSc (39%), followed by BA/BSc (30%). Entrepreneurs with only secondary education represent a significant portion too (17%), while entrepreneurs with Ph.D. or MBA only represent 6% and 8% of responder startups. Based on the self-reported motivations of startups, this distribution can be attributed to the following. Our respondents are generally not happy with the corporate lifestyle that they are forced into and the level of compensation relative to their

company's profit, this is one of the motivating factors for launching their startup. Additionally, they crave more creative freedom. These are signs that these startups previously worked or presently work in subordinate positions with relatively lower pay in the company, having to do repetitive tasks. These people generally have BA/BSc and MA/MSc degrees, and they feel that they are capable of higher-level tasks than the ones they are asked to do in their corporate jobs. On the other hand, only a small percentage of startups have an MBA degree, which can be attributed to the fact that many MBA degree holders are in higher level managerial positions, where they must use all their skills and energy. Ultimately, they have no energy and motivation left for other professional projects, such as startups. Ph.D. holders are very occupied as well having to constantly write new research papers, teach at their university and usually perform consultation and teaching outside the university too, this explains why only a small portion of startups have Ph.D. degrees (Herzberg, 2017).

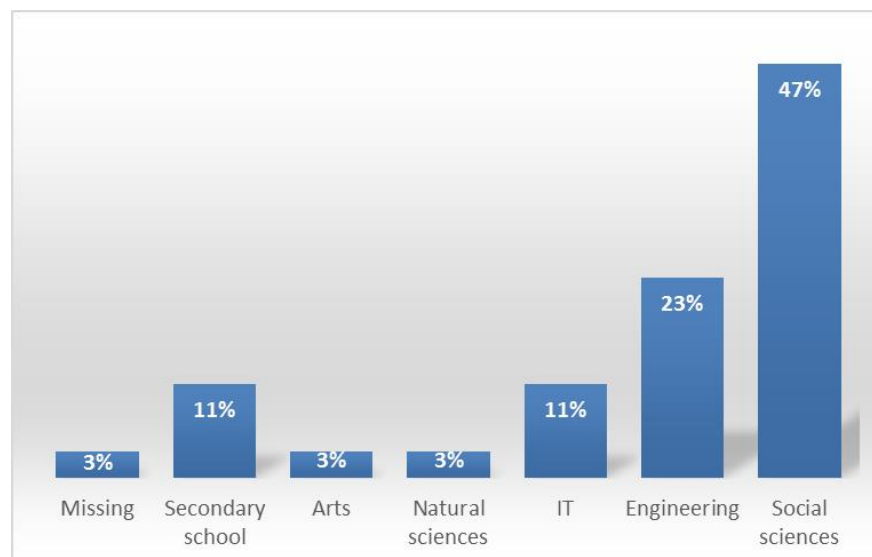
Figure 3: The highest education level of startups in the Hungarian startup ecosystem



Source: own database

Based on our survey, 47% of the Hungarian startups graduated in the field of social sciences. Within the field of social sciences, respondents from economic sciences represent 64%, marketing 9%, general business studies 6% finance 10% and 11% graduated from other fields. Engineering represents a significantly smaller segment of qualifications – 22,7%, information technology represents 10,6%, and finally the arts and natural sciences both represent 3%.

Figure 4: Startups' areas of education

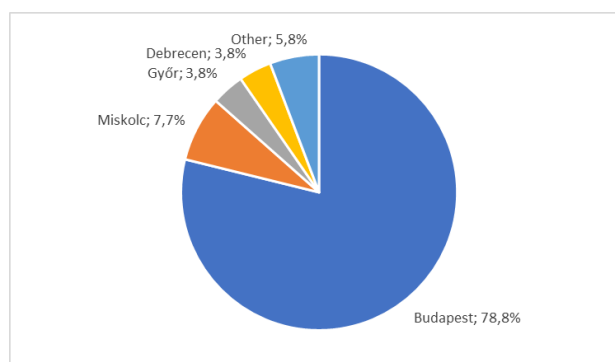


Source: own database

The startups believe that the most important skills and knowledge to launch a successful start-up are as follows: general business knowledge, project management, marketing, PR knowledge, and sales skills. They also regard the following fields crucial: legal, information communication technology, big data, and business analysis.

79% of the respondent startups were founded and operate in Budapest. Miskolc (7%) is the second most favoured place to establish a startup company. Overall, only 21% of the respondents chose a city that is not the capital. As a comparison, in Poland the most startups were located in the capital Warsaw, followed by Wrocław and Tricity (Morawska, 2015); most Slovakian startups also operate in the capital, Bratislava-Pozsony (Dzurovčinová, 2016); meanwhile the most startups in the Czech Republic operate in Prague followed by Brno (Staszkievicz & Havliková, 2016). In general, in the V4 countries the startups concentrate in the capital city.

Figure 5: Headquarters of the startups



Source: own database

Actors of the Hungarian startup ecosystem found Budapest the most attractive city in the CEE region, followed by Prague, Bratislava (Pozsony) and Vienna but Warsaw, Krakow and Berlin were mentioned as well. Regarding the Hungarian cities, the respondents found Budapest the ideal location, followed by Debrecen and Győr. We can conclude based on the survey that Hungarian startups are mainly middle-aged men from Budapest holding a BA/BSc or MA/MSc degree from the fields of social sciences, engineering and IT who were working a corporate job previously (RQ1). Thus, *Proposition 1a – “The Hungarian startups are fresh university graduates from Budapest” – is only partly supported*, as the startups are indeed mainly from Budapest, but they are not fresh university graduates.

3.3.1 Motivation for establishing a startup

Let us examine now the differences in motivations for launching a startup according to the age and gender of startup founders (RQ2). Based on the answers, the following motivational categories emerged:

- Young and bold
- Mission-sense
- Self-actualization.
- Autonomy, independence

Table 3 and Table 4 contains the results for the female and male subsamples. However, since there were 57 male and only 9 female respondents among the startups, the generalizability is much greater in the male subsample.

Table 3: Motivation for launching a startup - women

Age/ Gender	Women (n = 9)
19-25	Young and bold: “More freedom and free time”, “to have a challenging job”
26-35	Self-actualization: crave for success, come up with an idea
36-50	Self-actualization: “Based on my experience, I had an innovative idea.” or “I believe in my idea which should be realized.”

Source: own database

Table 4. Motivation for launching a startup - men

Age/ Gender	Men (n = 57)
19-25	Young and bold

26-35	<p>Self-actualization: “I want to realize my idea”, “addiction to do something new.” “to put my dream into practice”, “to have a good group to work with”</p> <p>Mission-sense: “to create something permanent, everlasting”</p>
36-50	<p>Autonomy, independence: “to get a higher share from the profit”, “being fed up with the corporate lifestyle”</p> <p>Mission-sense: “to make something valuable”</p> <p>Self-actualization: “to realize an idea”, "I am a born entrepreneur”</p>

Source: own database

Based on the answers about motivation, it is useful to investigate how experienced a startup entrepreneur is. Partly, they are fed up with the atmosphere of multinational companies. Stadnicka and Sakano (2017) show that multinational companies should motivate their employees to be a part of innovation and value creation, but this behavior is hardly recognizable in the Hungarian scene. In the age group of 36-50, some male respondents identified themselves as „born entrepreneurs” which can indicate that entrepreneurs in this age group reached the pinnacle of their craft. *Proposition 1b – “The main motivation for establishing the startup comes from the profit angle” – is partly supported*, as the financial gain indeed plays a role in their motivation, but only a minor one, the dominating motivational factor seems to be the need for freedom, challenge and the opportunity to realize an innovative idea among both women and men. Regarding the entrepreneurial experience, it is important to know whether the startupers have taken part in a failed startup or not. 40% of the startupers participated in at least one failed startup but only 14% participated in more than one. 36% of startup founders in Slovakia were shown to have already participated in a failed startup, which is very similar to the Hungarian result (KPMG, 2016).

Another indicator of a “born entrepreneur” or the entrepreneurial experience is the current occupation of the startuper. The respondent could choose from the following answers: I am a student; I am a freelancer; I am doing my startup besides my full-time job; I am involved in one or more businesses; my startup is my full-time job. Based on the answers, 35% of the startupers count his startup as a full-time job and 25% are involved in more than one startup. 17% of them manage their startup besides their full-time job. Only 9% of them deal with the business besides their higher education studies and 14% of them are freelancers.

3.3.2 *Scaling strategy*

The scaling strategy of a startup is the plan for increasing the number of customers on the national, regional and global levels while keeping the marginal costs low. This section examines what do startups consider the main challenges of scaling their business (RQ3). Startups typically provide a service to their customers via the internet and through client computing devices (PC, tablet, smartphone). It is easier to “scale” by providing internet-based services/products than physical products. When increasing the sales volume of IT services/products, the main additional cost is the purchase of new servers or new customer service staff. Meanwhile, if a manufacturing company wants to increase its sales volume, it has to install new production lines or even build new factories, all of which take a significant amount of investment. The marginal cost of creating physical products is also much higher than the marginal cost of an IT startup. Consequently, startups can grow their customer base and revenue with relatively low additional investments, assuming their product or service can be scaled, and the company has an appropriate scale strategy.

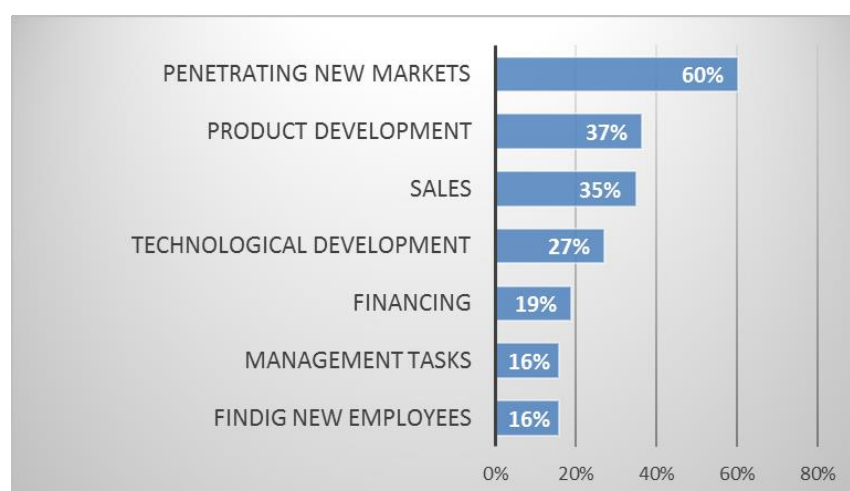
It is another question whether it is beneficial to the whole economy that the main type of funded startups is the IT startup. This restricts many novel business ideas from realization which would require a substantial workforce. This fact, unfortunately, limits the job creating potential of the classic startup, which we will examine in more detail in the next section. The other issue with the dominance of IT startups is the increased difficulty that hardware startups face when seeking financing. It is much more costly for hardware startups to develop the prototype, they generally have lower profit margins and lower scalability. Hardware startups thus increasingly utilize crowdfunding to secure financing, rather than to compete with software startups for venture capital financing. Government sponsored venture capital investors could help hardware startups to get funded, expanding the job creating potential of the startup sector.

In the survey, 73% of startupers stated that they possess a scaling strategy. The greatest challenges of a scaling strategy were considered the following: financing, penetrating new markets and the lack of distribution channels. As Hungary is a small and open economy, it is essential for startups to penetrate external markets to achieve economies of scale within the investment period. Based on our survey, most of the Hungarian startupers thought that access to international markets has the greatest impact on the growth potential of their company. Consequently, 50% of startupers marked the following activities as priorities for the next year: increasing the sales volume and

penetrating new markets. Even though most of the startups plan to extend their operation abroad, only 10% of the respondents stated that they have at least one foreign founder. 60% of startups also need assistance to enter foreign markets. In the V4 targeting the international markets is also very prevalent: in the Czech Republic 75% of startups export goods or services (Staszkievicz & Havliková, 2016), in Slovakia 79% of startups focus on export (Dzurovčinová, 2016). Poland is the V4 member which can afford to focus on its domestic market the most thanks to its size and population, in Poland only half of the startups carry out export activity (Skala and Kruczkowska, 2016).

On the one hand, startups must concentrate on their sales activity. On the other hand, the product or service needs constant development, particularly in the first 1-3 years. Product development was also mentioned by 50% of the companies as a main priority in the next year. In the survey, multiple choice questions were used to determine the area where startups believe that they need assistance (Figure 6).

Figure 6: Activities where the startups need assistance



(Source: own database)

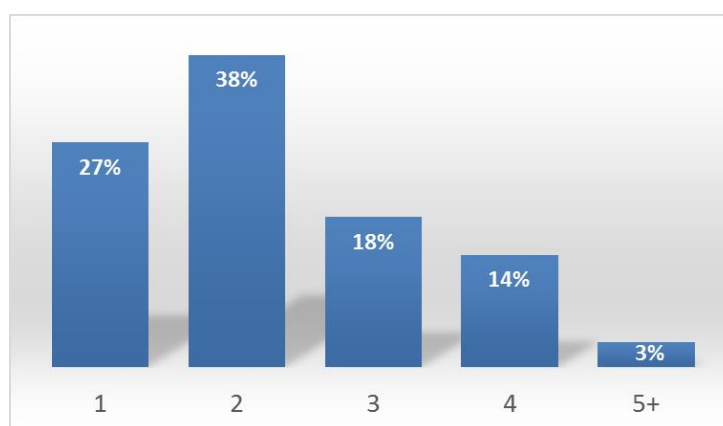
The activity where most startups need assistance is entering new markets. Since the startups also indicated penetrating new markets as one of their biggest challenge in scaling the business, *Proposition 2a – “Hungarian startups consider international expansion as their biggest challenge” – is supported*. This is followed by product development, sales growth, and technological development. Only 19% would like to use external help in raising funds and just 16% need assistance in organizational development and workforce expansion. Further results correspond with the findings in

the educational part of the study. About 50% graduated in the field of general business science and only 11% in the field of information technology. This explains why the startupers are looking for assistance with the product and technological development in a large part. According to the survey, 20% of startupers considered Hungary their main market and 70% think that their product/service will be in demand on the global market. Startup founders should make sure to have at least one technical expert who is responsible for the development of the product or service among the founders at the very start of the project.

3.3.3 Job creation

A well-known positive externality of startups is job creation. It is one of the positive externalities that are frequently used to justify government intervention at the startup financing market. Job creation happens not only by hiring new employees at a startup, but the founders of the startup themselves can also be considered as employed. We now investigate the job creation potential of Hungarian startups (RQ4). According to the survey, 35% of startup companies have more than two founders, 38% have two founders, and 27% have only one.

Figure 7: Number of founders



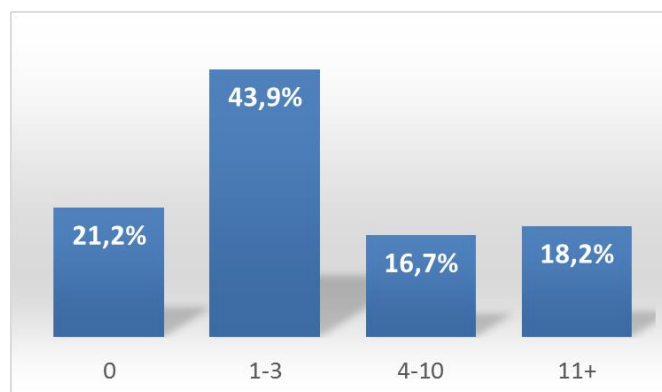
Source: own database

Only 21% of the startups did not have any employees. Traditionally, in the earliest stage of development, the founders do all the work, and they hire new employees as the firm grows. Most surveyed startups (43,9%) employ 1 to 3 people. 81,8% of startups employ less than 10 people. This company size is typical for early-stage startups. The percentage of startups employing less than 10 people is 59% in Poland (Skala and Kruczkowska, 2016), 63% in Slovakia (Dzurovčinová, 2016), and 90% in the Czech

Republic (Staszkievicz & Havliková, 2016). This places the result of our survey in the middle of the pack regarding the V4 countries.

On the other hand, 18,2% of the surveyed startups have more than 10 employees, which indicates that there are a fair number of startups in an advanced stage of development at the Hungarian market. Particularly, two startups had a substantial number of employees – 40 and 50 –, this company size can be usually reached only after several rounds of investment.

Figure 8: Number of employees

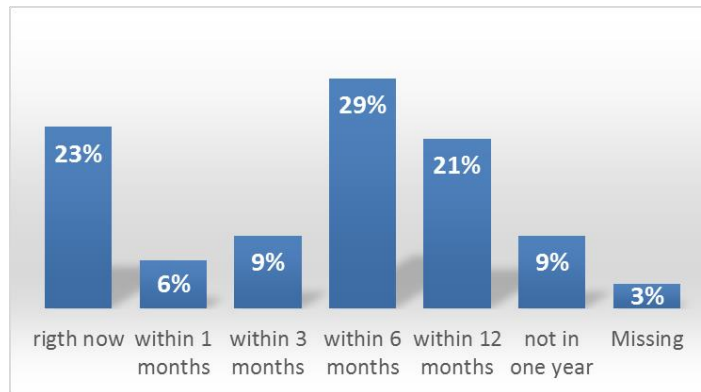


Source: own database

Regarding the nationality of the employees, 90% of the startups employ Hungarians only, while 10 % employ foreigners too. This seems to indicate that Hungarian startups want to strengthen their international relations through agents primarily outside their company's employees – such as consultants or mentors.

Now let's look at the future employment plans of the startups. 23% of the surveyed startup companies want to employ new staff right now, 69% of them plan to hire new employees in 6 months or sooner, and 88% of them plan to recruit new employees within a year. These numbers show the job creation potential of the startup sector, and thus *support Proposition 2b – “Hungarian startups have considerable job-creating potential”*.

Figure 9: When do startups plan to hire new employees



Source: own database

3.3.4 *Financing*

Now we investigate what financing sources do Hungarian startups use (RQ5). In this study, the following development phases of the startups were distinguished:

Idea/concept phase

Beta version/prototype and product validation

Early revenue generation

Expanding/growing revenue generation

Mature company

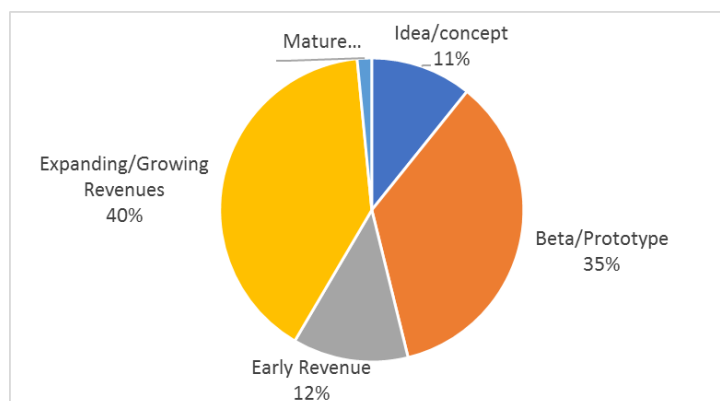
Incubator houses and accelerators support startup companies from the earliest phase when only a business idea is available and there isn't even a prototype yet. However, venture capital investors prefer startups in a more mature stage, preferably in the phase of early revenue generation, followed by expanding/growing revenue generation and the phase when the startup possess merely a beta version or a prototype of the product, but the product is validated.

Aman and Lovas (2015) also found that venture capitalists typically finance small and medium-sized enterprises with high growth potential. Venture capital investors prefer companies that already generate revenue and are in their growth phase. Lovas and Riz (2016) found that incubators, accelerators, business angels are willing to support startups in an earlier phase, but they are also looking for companies with high growth potential. They expect merely a developed product/service and support the startup to introduce their product into the market.

In the survey, 52% of the startup participants have already generated revenues, and are potential investment targets for venture capital investors. Furthermore, 35% of

startups have a beta version/prototype that can achieve support and funding from accelerators/incubator houses.

Figure 10: Maturity of Hungarian startups

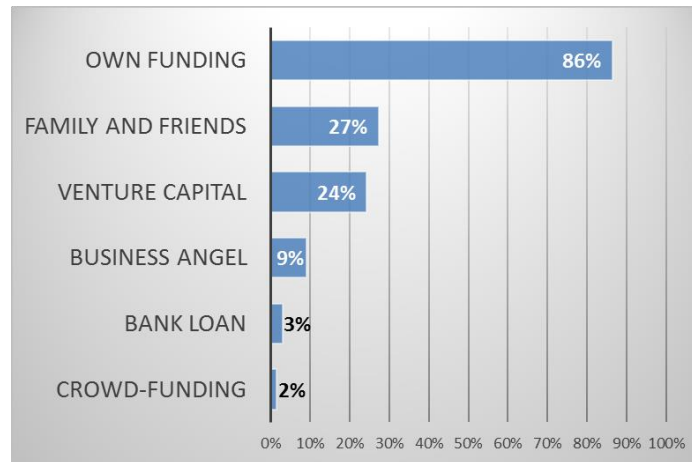


Source: own database

Regarding the size of the requested share for the capital invested, most of the investors indicated the range 0-50%. We can conclude that they typically leave the majority ownership in the hands of the original owners, and they acquire only a minority interest in the companies. Accelerators typically require a smaller share in return for their investment than venture capital funds. Only a small fraction of the stakeholders mentioned that they require occasionally majority ownership.

As we have seen, startup entrepreneurs are typically middle-aged, so they may have accumulated savings. 17% of them work full time and 75% are committed to one or more startup businesses simultaneously. Financing is considered as the biggest challenge for implementing the long-term scaling strategy. Connection to the financiers and acquiring the necessary information were mentioned as the biggest difficulties in fundraising. The additional difficulty is the length of execution. We found that 86% of entrepreneurs started their business from their own savings and 27% of founders received capital from their family members or friends. Only 24% of the start-up companies raised their capital from venture capital investors, 9% mentioned business angels. Thus, *Proposition 2c – “Hungarian startups mainly employ venture capital as the main source of financing” – is partly supported*, as venture capital indeed plays a large role in their funding, but not the biggest. A bank loan is not a significant source of funding, just a small number (3%) of respondents reported receiving financing from banks. Not surprisingly, as these companies are typically not mature enough for commercial bank loans.

Figure 11: The main initial financing source of startups

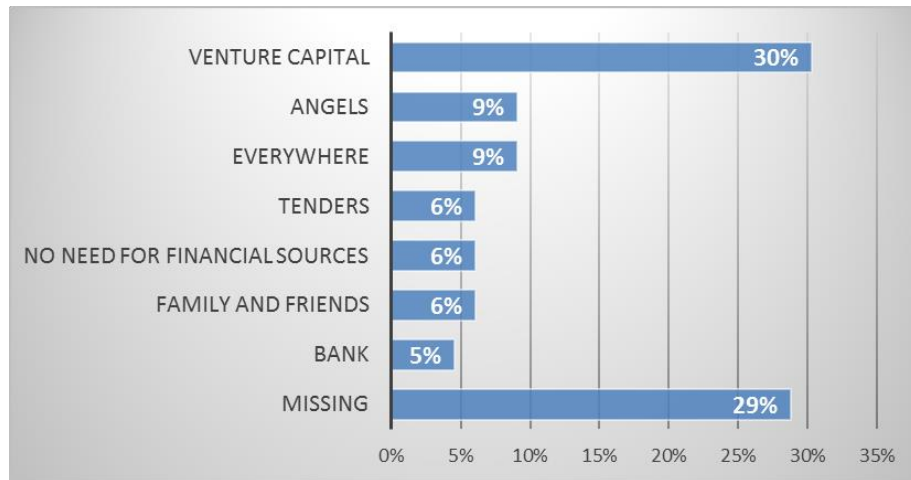


Source: own database

When we look at the financing sources of startups from the other V4 countries, we see a similar pattern. Using the founder's own resources are the main source (79% of startups in Poland, 78% in the Czech Republic, and 87% in Slovakia used it), venture capital involvement is also similar (22% in Poland, 12,8% in the Czech Republic, and 24% in Slovakia), but there is a large emphasis on state grants: 24% in Poland, 12% in the Czech Republic, and 21% in Slovakia (Staszkievicz & Havliková, 2016; Dzurovčinová, 2016; Skala and Kruczkowska, 2016). It must be noted, however, that in Hungary, state grants often take the form of governmental venture capital investment. This phenomenon will be investigated further in later chapters. Summarizing the factors discussed earlier, it can be stated that there are several similarities between the Hungarian startup ecosystem and the startup ecosystem of the V4 countries: the concentration of startups in the capital, the percentage of startupper who have already participated in unsuccessful startups, startups' intention to enter foreign markets, startup funding sources and the size of the startups in terms of the number of employees, thus *Proposition 2d – “The domestic startup ecosystem is similar to the startup ecosystems of other V4 countries in terms of key features” – found support.*

All startups must develop their product and service in their first years which demands new financial resources constantly. The investigated startups are on different levels of maturity; therefore, they can appeal to different financiers. Fig. 12. shows that 30% of the startupper try to involve venture capital investors in their business. 9% appeals to angel investors and only 6% plan to turn to family members or friends for new financing sources.

Figure 12: Where do the startups search for new financing sources?



Source: own database

Crowdfunding has not played an important role in Hungary so far, only 2% of startups reported to use it. However, Liu and Wang (2018) reflect the advantages of crowd-funding. Their study shows that firms due to the crowdfunding acquire more accurate market feedback regarding their new product than firms which are financed by venture capital funds. The result of this investigation corresponds with the findings of Dong and Men (2014), who stated that the availability of external funding sources for young, small and non-manufacturing companies are limited. These characteristics are appropriate to a typical Hungarian startup as well.

3.4 Evaluation of the startup ecosystem

In the following subsection, we examine the importance that responding ecosystem actors attach to each ecosystem characteristic and how strong they consider it to be in the domestic ecosystem, and whether there are any differences between the opinions of the ecosystem members (RQ 6-9).

3.4.1 Importance of the startup ecosystem characteristics

To answer RQ6, let's look at the importance that ecosystem participants attach to the different factors (as seen in the table below).

Table 5: Importance of the startup ecosystem characteristics

Characteristics	Central tendency measures				95% confidence interval of mean		Very important (4) and absolutely essential (5) frequency
	Mean	Median	Mode	Std. Deviation	Lower	Upper	
Group 1							
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
Group 2							
Presence of successful startups 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
Group 3							
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
Group 4							
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

We can identify 4 groups using the central tendency measures and the frequency of (4) and (5) answers as guidelines:

1. Group 1 included those characteristics that were considered most important to members of the startup ecosystem: inclination for cooperation among the members of the ecosystem, international relations, advanced entrepreneurial culture, access to funding and access to sufficiently educated workforce. All the elements of this group have medians and modes of 5, and a mean of equal to or greater than 4,25. In this context, advanced entrepreneurial culture included the opportunity for failed startups to start again. *Proposition 3a – “Hungarian startup ecosystem members consider access to financing to be the most important characteristic in a startup ecosystem” – is partly supported*, as the access to financing is found to be one of the most important characteristics, but it is surpassed by two other factors.
2. The second group consists of the presence of successful startups in the community as mentors, or angel investors; the number of high-quality ideas or projects; favorable tax environment for entrepreneurs; and favorable level of required administration for entrepreneurs. This group has median and mode values of 4 and 5 and a mean greater than 4.
3. The third group includes access to mentors, advisers, coaches; access to entrepreneurial education; social events (meetups, networking); and technology transfer. The members of this group have mean values between 3 and 4.
4. The lowest importance group consists of the presence of co-working spaces and startup competitions. These items have medians and modes of 3 and a mean ~3.

The ecosystem members rated the importance of access to funding among the highest, while they rated the importance of startup competitions among the lowest. This may reflect that the primary channel for startups to meet investors is not considered being exposed to them during a startup competition, but alternative, possibly more proactive methods.

To answer RQ7, if we look at the tests for significant differences among the startup ecosystem member sub-groups (Table 6), we see that the one-way ANOVA detected significant differences associated with the presence of co-working spaces and the favorable tax environment for entrepreneurs, thus *Proposition 3b – “There are no significant differences between the opinions of the ecosystem member subgroups about the importance of the startup ecosystem factors” – is not supported*. The importance of the presence of co-working spaces was rated significantly higher by the representatives of co-working spaces than by investors and startups. It is natural that agents

overestimate their own importance in any ecosystem, but the below average importance rating by the startups themselves is rather surprising. Regarding the importance of favorable tax environment for entrepreneurs, startups rated this characteristic significantly higher than incubators and accelerators. This can be attributed to the fact that the startups themselves feel the financial burden of managing a startup each and every day, while those members of the ecosystem that are more focused on providing help and coaching for the startups focus more on inner factors that can be improved and less on external factors.

Table 6: Comparison of sub-sample means (ANOVA and Hochberg at $\alpha < 5\%$)

	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

3.4.2 *Evaluation of the startup ecosystem characteristics*

Now let's continue with our analysis of how the members of the ecosystem rated the characteristics of the Hungarian startup ecosystem (RQ8). Based on Table 7, the following groups of characteristics can be identified using the central tendency measures as guidelines:

Table 7: Evaluation of the startup ecosystem characteristics

Characteristics	Central tendency measures				95% confidence interval of mean		Good (4) and very good (5) frequency
	Mean	Median	Mode	Std. Deviation	Lower	Upper	
Group 1							
Social events (meetups, networking)	3,71	4	4	0,820	3,547	3,873	61
Group 2							
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
Group 3							
Presence of successful startups 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
Group 4							
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
Group 5							
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

The **top characteristic** forms a group in itself based on the distance between itself and the second most highly rated factor in terms of the central tendency measures and also the frequency of (4) and (5) answers. This characteristic is the social events (meetups, networking), which has a median and mode of 4 and a mean of 3,71.

The **second group** consists of the presence of co-working spaces; startup competitions; the number of high-quality ideas or projects; and the access to mentors, advisers, coaches. Members of this group have median and mode values of 3 and means between 3 and 3,5. It is surprising that the presence of co-working spaces and startup competitions were rated as the least important factors in a startup ecosystem by the respondents, meanwhile, these two are also rated among the most strongly developed characteristics at the Hungarian ecosystem. It should also be noted that the rating of this group despite almost being on the top of the list is only around average.

The **third group** includes the presence of successful startups in the community as mentors, or angel investors; access to funding; and inclination for cooperation among members of the ecosystem. The median and mode of this group is 3, and the means of factors in this group are between 2,8 and 2,9. Despite the cooperation between ecosystem members being the most important single characteristic, and access to funding being one of the most important characteristics, the rating of these at the Hungarian ecosystem are slightly below average, thus *Proposition 4a – “Hungarian startup ecosystem members consider access to financing to be the strongest characteristic in the Hungarian startup ecosystem” – is not supported.* Building cooperation between the ecosystem members can happen organically throughout the evolution of a startup ecosystem, which can happen in Hungary as the ecosystem matures. Policymakers can also consider how they can help speed up the process, according to our survey, organizing more startup competitions is not the answer. Also, despite the governmental venture capital initiatives in recent years, such as the Jeremie program and the creation of the Hiventures venture capital fund manager, ecosystem members still feel that the access to funding is slightly below average in Hungary. It is possible that there are other factors prohibiting the startups from taking advantage of the large capital supply accessible at the market, such as a lack of skill in presenting their idea and convincing investors.

The **fourth group** contains technology transfer; access to sufficiently educated workforce and international relations. Members of this group have median and mode values of 2 or 3 and means between 2,6 and 2,7.

The **fifth group** contains four factors: access to entrepreneurial education; favorable tax environment for entrepreneurs; advanced entrepreneurial culture (opportunity to start again after failing a startup); and favorable level of required administration for entrepreneurs. Members of this group have medians and modes of 1 and 2 and means below 2,5.

In developed startup ecosystems, investors consider having failed startups a sign of entrepreneurial experience on behalf of the startuper, and formerly we saw how highly the Hungarian ecosystem members valued the importance of this characteristic. It is disconcerting to see how underdeveloped this entrepreneurial culture is in Hungary, maybe this is something that policymakers should try to strengthen. On the other hand, entrepreneurial education on universities is heavily subsidized by the state, but still ecosystem members feel it to be poorly accessible. This could be attributed to the fact that at universities entrepreneurial education is mostly theoretical, and the practical parts consist mostly of pre-planned exercises and case studies. It is possible, that ecosystem members want an education that is more focused on creating actual new ventures, led by experienced entrepreneurs providing assistance with the process. This could be perceived as a pre-incubation, practice-driven educational process.

When we look at the significant differences between the ecosystem member subgroups regarding the evaluation of the factors (RQ9) in Table 6, we see that there are two factors where we can find such differences, thus *Proposition 4b* – “*There are no significant differences between the opinions of the ecosystem member subgroups about the evaluation of the Hungarian startup ecosystem factors*” – *is not supported*. The first is the evaluation of access to funding at the Hungarian startup ecosystem. Particularly, startupers rate this characteristic significantly lower than incubators and accelerators. This can be explained by the fact that incubators and accelerators as providers of early-stage investments don’t have to go through the hardships that startupers must go through to secure their financing. The second characteristic is the evaluation of access to a sufficiently educated workforce at the Hungarian startup ecosystem. Corporations rate this significantly lower than investors. Corporations have an interest in the startup scene in supporting startupers to innovate in their industry, in the hopes of acquiring those startups when their development level reaches a sufficient level. It is very likely that corporations base this rating on their own subjective experience when it comes to finding and hiring an educated workforce, and they project this onto startups. Investors,

on the other hand, have a closer relationship to startups and possibly see the situation in a more realistic way.

At this point it is useful to look at the strengths and weaknesses of the startup ecosystems of the other V4 countries based on the survey of Beauchamp and Skala (2017). They found that the Czech Republic had the highest R&D investment activity, a high rank of global technology outputs based on the Global Innovation Index and was the most active in patenting trademarks. Their weaknesses included few startup events, low available venture capital investment, and low public-sector financing. It is worth noting that in our survey, the Hungarian ecosystem members rated startup events as the strongest characteristic, but its importance was perceived as one of the lowest. Beauchamp and Skala (2017) showed that the strengths of the Polish ecosystem is partly based on the size of the country, with considerable economic and human capital, high domestic consumption, all these factors making the country's startups the least dependent on export activity. Additionally, it is the only V4 country with more than one major startup hub. Their weaknesses include low R&D spending and the lowest rank in the Global Innovation Index. Finally, Slovakia was found to have the highest efficiency of labor, high export activity, strong e-commerce market, and its crowd-funding market was the most popular out of the V4. Its main weakness was, however, the highest rate of unemployment within the V4. Hungary's strengths include that it hires new employees the most often, high activity of local venture capitalists, a high rank of global technology outputs based on the Global Innovation Index, and the highest mobile penetration. Compared to Poland, Hungarian startups must focus more on international markets, and based on our survey the entrepreneurial tax environment, administration requirement and entrepreneurial education opportunities must be improved.

3.5 Summary

In conclusion, we can say that the Hungarian startupers are generally men in their middle years from Budapest, who have experience at multinational companies or as an entrepreneur. Almost half of them have already taken part in a failed startup. Only a small fraction of our respondents are students at a university. Overall, startupers have a qualification in business sciences (marketing, finance or economics) at least as BA students. In the case of the younger generation, the main motivation for launching a startup is to have more freedom and challenge. For older respondents, motivation comes from a kind of burn-out. Many of them are opposed to the culture of multinational

companies. In general, the middle-aged groups want to “re-establish” themselves and to realize their innovative idea. Startups need external help the most with entering new markets, product development, and sales activity. Startups have substantial job-creating potential, as almost all of the respondents indicated that they plan to hire new employees within a year. The main initial financing source comes from own funding, family and friends, and venture capital, but the startups are primarily seeking further funding from venture capital.

The chapter also examined how the members of the startup ecosystem – startups, venture capital investors, incubators and accelerators, corporations, and co-working spaces – think about the importance of the ecosystem’s characteristics and how they evaluated these characteristics in the Hungarian ecosystem. They deemed the cooperation among the ecosystem members, international relations, and the opportunity for startups to start again after a failed startup the most important characteristics. The presence of co-working spaces and startup competitions were rated as the least important. They also feel that co-working spaces and startup competitions are overrepresented in the Hungarian startup ecosystem compared to their perceived importance. They found social events (such as meetups and networking) to be the strongest characteristic of the Hungarian ecosystem. On the other hand, access to entrepreneurial education; favorable tax environment for entrepreneurs; advanced entrepreneurial culture (opportunity to start again after failing a startup); and favorable level of required administration for entrepreneurs were found to be the weakest characteristics of the Hungarian ecosystem.

Table 8: Result table for chapter 3

	Proposition	Supported	Partly supported	Not supported
P1a	The Hungarian startups are fresh university graduates from Budapest.		X	
P1b	The main motivation for establishing the startup comes from the profit angle.		X	
P2a	Hungarian startups consider international expansion as their biggest challenge.	X		
P2b	Hungarian startups have considerable job-creating potential.	X		
P2c	Hungarian startups mainly employ venture capital as the main source of financing.		X	

P2d	The Hungarian startup ecosystem is similar to the startup ecosystems of other V4 countries in terms of key features	X	
P3a	Hungarian startup ecosystem members consider access to financing to be the most important characteristic in a startup ecosystem.	X	
P3b	There are no significant differences between the opinions of the ecosystem member subgroups about the importance of the startup ecosystem factors.		X
P4a	Hungarian startup ecosystem members consider access to financing to be the strongest characteristic in the Hungarian startup ecosystem.		X
P4b	There are no significant differences between the opinions of the ecosystem member subgroups about the evaluation of the Hungarian startup ecosystem factors.		X

Source: own editing

This chapter presented general findings that help to understand the startups' behavior and characteristics and collected the key factors of the development of the startup ecosystem. This research helps startup entrepreneurs, policymakers, and various investors to understand the actual market situation, problems, and challenges that startupers currently face.

4 Governmental involvement at the venture capital market²

This chapter focuses on the reason for governmental intervention and uncovering the main questions that researchers pose and try to answer connected to governmental venture capital. First, let's categorize governmental intervention at the venture capital market into two major types.

1. Purely governmental venture capital – also known as direct intervention. It is characterized by the government being both the owner of the venture capital fund management company and of the managed fund itself. The private sector is not present in this type of intervention.
2. Governmental-private venture capital partnership. 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).

The studies evaluating these two types of governmental involvement will be presented in great detail in this chapter. The phenomenon of governmental venture capital received much attention in the international literature. What differentiates literature reviews is not only the requirements posed by the development level of the investigated research field, but also the number and detail of the dimensions that are being investigated (Paré et al., 2015).

Governmental involvement at the venture capital market has been the subject of two literature reviews so far (Callagher et al. 2015; Colombo et al. 2016). Both reviews give a summary of the main findings in the research field from the period 1988-2014. These literature reviews fall under the category of narrative reviews since they do not document the data collection and data analysis process and don't employ frequency counts.

We briefly review which market failures justify government intervention in the venture capital market, and then, based on a systematic review of the literature, we

² I performed this research with Erika Jáki, the resulting paper is under publication at the *Acta Oeconomica* journal

provide an overview of research on government venture capital financing published in Scimago-rated journals between 2000 and 2018. Research to date has generally focused on whether government intervention in this market is justified and effective.

Our research provides a valuable summary in an international context that can be useful for decision makers and venture capitalists who want to better understand international examples of public venture capital intervention. Another aim of the chapter is to encourage further research in the field, which can focus on more appropriate success criteria for public venture capital initiatives, which can increase the added value of the research field as a whole.

4.1 Governmental intervention as a consequence of market failures

Governmental intervention at the venture capital market is a consequence of this market's characteristics: the targeted seed stage and startup companies have high risk and the present market failures obstruct the private investors. Based on the relevant literature and local market practices, it is important to analyze market failures (Kovács, 2011 and Karsai, 2004) which result in the inability of the private sector to provide enough equity to seed stage and startup companies. The objective of this sub-chapter is to answer the main research questions: why state involvement is needed in this sector and how do these involvements materialize in practice at a local market.

Market failures can appear in several forms, and all can indicate market distortions: problems with public goods, the presence of monopolistic and oligopolistic market participants, asymmetric information, transaction costs and externalities (Szentes, 2006, Lovas, 2015). The following failures occur in venture capital market financing (Lovas, 2015):

- *Asymmetric information*: as start-up companies have no track record in their business model, there is few and uncertain information about the company's past and especially about their future. Therefore, it is difficult for investors to assess the quality and the feasibility of the project.
- *High transaction costs*: young companies usually require a small amount of capital while the fixed cost of each investment process is high.
- *Externalities*: supporting these innovative start-up and seed stage companies can result in some positive macroeconomic effects in the domestic economy.

These market failures lead to a shortage in the capital supply at the market, which also also called financing gap. During the period of 2007-2013 the financing gap of the Hungarian venture capital market was estimated to be 165 billion HUF (Deloitte Zrt., 2016).

4.1.1 Asymmetric information

To find an appropriate financing partner, seed and start-up companies must present a business plan. Apparently, all inventors, contractors and entrepreneurs believe in their idea, but their business plan is obviously overoptimistic. Business plan-based decision-making is discussed in the literature in details. The cognitive sources of overoptimism during the preparation of a business and financial plan are presented by Jáki (2010). Kirsch, Goldfarb, Gera (2009) studied the venture capital decision-making process based on the submitted business plan. Balboni, Bortoluzzi, Tivan, Tracogna, and Venier (2014) gave a literature review of the growth drivers of start-up firms and their business modeling. Venture capital decision makers are often forced to make fast decisions and in such settings. Decision makers rely on heuristics to facilitate decisions.

In all financing cases, the elaboration and evaluation of all business plans are characterized by asymmetric information which can also be simplified as lack of trust by the investors in the original owners and their submitted business plans. Trust was identified by Paliszkievicz (2011) a major factor influencing capital investments. This asymmetrical information can lead to the phenomenon of adverse selection, when out of all available investment options the investor does not select the best one because of a lack of information. For example, company A with bad growth prospects portrays itself as a good investment and willing to hand over a majority share in the company in exchange for the investment. Company B, however, which has very good growth prospects fails to portray itself as an attractive investment and wants to keep the majority equity share in the company, which leads to the investor selecting company A. Company A knew that its value is low, that is why it was willing to part with the majority of the ownership, while company B knew that its value was high, and that's why it asked to retain the majority of the ownership. This simple example illustrates the way that adverse selection works in the investment market, akin to how it works in the original example of Akerlof's market for lemons (Akerlof, 1978).

The informational asymmetry can also lead to moral hazard or agency costs in the venture capital financing setting, which would mainly appear as the risk of the

entrepreneur not committing its full effort toward the success of the project after securing the investment. In theoretical models this is referred to as the risk of the agent misbehaving (Berlinger et al., 2017). This very real risk is another reason why financing in this early stage is so costly and hard to obtain.

High-level uncertainty and therefore severe asymmetric information problems arise by almost all classic parts of the business plan (marketing and sales plan, operational plan, investment plan, organizational structure) and can be hardly treated. A seed stage company cannot give a detailed *product/service description* – especially in the information technology sector. venture capital investors usually reject these companies because of the undeveloped nature of their business. In the case of seed stage companies, it is a real challenge for the founder to create a detailed *marketing and sales plan* without the exact knowledge of what the product/service is. Since start-up companies already possess a working prototype, the marketing and sales plan is a crucial part of the development of their business. The expertise and experience of the marketing/sales director have significant importance, which must be convincingly communicated to the investor. Industrial analysis is often a struggle since the product/service can create an entirely new, untouched, ‘blue ocean’ industry (Kim, and Mauborgne, 2004). A seed stage company typically has a delineated idea about the exact *operational process* since even the central concept of the business is not finalized. Start-up companies can usually go into more details and can make the operational plan more credible. Finally, seed stage and start-up companies usually spend most of the invested capital on labor and personnel, therefore one of the most important parts of the business plan is the introduction of the *management team and the organization* (Sahlman, 1997).

Based on all this we can see that a seed stage and a start-up company try to sell mostly a business idea. The organization is incomplete, the company’s supply, demand and industrial risks are hardly forecastable. The initial investment will be spent on the intellectual property, R&D or marketing, the efficiency of which is hard to measure. It is understandable why angel investors and the so called “family, friends and fools” are the main source of capital for seed companies, as the information asymmetry is usually too high for classic institutional venture capital investors. Since investors get more (but still insufficient) information about start-up companies, venture capital funds focus more commonly on start-ups rather than on seed stage companies.

4.1.2 Transaction costs

To see how the market failure of transaction costs manifests on the venture capital market, let us now examine the venture capital investment process. The fund manager company collects liquid funds from different investors into a venture capital fund. It invests from the fund into target companies in line with the authorized Management Guidelines. The investors of the fund expect a return on their investment, so the investment decisions must be made carefully by the fund management to meet return expectations. To understand why transaction costs is a market failure at the venture capital market, the decision-making process is presented. The investment process is composed of four different phases:

- I. *Investment decision.* Before signing the investment contract, the investment manager should assemble the investment proposal and submits to the decision maker boards. First, the investment manager must filter the fund requests and carefully evaluate the chosen projects in cooperation with the legal and risk division of the fund manager company. Based on legal requirements, venture capital fund manager companies must operate an independent risk management division and employ a lawyer. Commonly legal, financial, operational or another type of due diligences is made, where the investment manager coordinates the whole process. Overall, a minimum of three divisions are required to prepare an investment proposal: investment managers, legal experts, risk experts and finally the forum of decision makers, which can be a committee, board, etc. are required, too. After a positive investment decision, the fund manager company signs the detailed investment contract (terms of ownership rights and obligations, terms of disbursement and exit, etc.) with the target company on behalf of the fund.
- II. *Disbursement.* The contract signing and founding of the company is followed by the disbursement. This is done after verification of the financial and legal contractual obligations. This review process is done by the investment manager, the legal expert and the risk management representative for maximum prudence.
- III. *Monitoring.* Following the disbursement, the ownership rights of the fund must be exercised. The target company must be monitored continuously based on quarterly, semiannual or at least annual reporting specified in the

investment contract. Monitoring is responsible for checking the realization of the business plan, main financial data, customers' and suppliers' contracts made during the investigated period and to measure all risk factors. This is executed by the monitoring manager, in some cases in cooperation with the investment manager. The monitoring report must be also reviewed by the risk division. The fund manager company's representative gets a mandate to take part and vote at the general assembly and the fund manager company also has the right to mandate one or more members of the board of directors or supervisors. Overall, monitoring managers, risk and legal experts are required to monitor the investment.

- IV. *Exit.* In case of a successful investment, the fund can realize the return by exiting from the company. This process also requires active involvement by legal and risk manager experts in addition to the monitoring representative's opinion.

Overall, the typical investment decision, disbursement, monitoring and exit process is long, complex and expensive. Therefore, it is not economic for the fund manager company to even start the investment decision-making process under an investment threshold. The theoretical model of Berlinger (2017) shows that the state can help overcome this market failure by providing subsidized investment, helping the project reach a stage in which the private sector will become willing to finance it further.

4.1.3 Externalities

High transaction costs and severe asymmetric information problems are obvious obstacles for private investors to be more active in this segment of venture capital financing. However, without financial resources, many promising ideas of these seed stage and start-up companies couldn't be introduced into the market. Therefore, programs helping to finance these companies can also be explained and justified by the positive externalities associated with financing innovative young companies. These positive externalities may also justify active participation from the government's point of view. According to Karsai (2013) state participation is needed on the venture capital market, because the state considers other goals than just profit realization. These include motivating the local innovation, supporting social and regional economic development, establishing new jobs and increasing tax income spent on social services, promoting

sustainable development and renewable energy solutions. If the entrepreneurs can't find investors in their homeland, they turn to foreign investors and possibly bring their idea abroad. The theoretical model of Berlinger et al. (2017) shows that the optimal amount of state support drives the entrepreneur to make a serious effort to achieve the success of the firm, thus reducing moral hazard. It also increases social welfare and does not crowd out private investors, but also increases private investment activity. Although positive externality is one of the most powerful and easily understandable explanations for government intervention, quantification of these benefits is extremely difficult.

It is also important to mention negative externalities, since investments in the wrong sector can lead to negative overflowing effects. Companies that produce negative externalities generally include tobacco companies, weapon manufacturers, casinos, production of pornographic content. Coincidentally, these are the same types of companies which can not receive investments from the Hungarian governmental GINOP venture capital program (Palyazat.gov.hu, 2017). In summary, governmental investments should promote positive externalities and avoid negative externalities. In the rest of the chapter, a qualitative systematic literature review is presented which examines governmental venture capital programs in various parts of the world.

4.2 Research design for the qualitative systematic literature review

Systematic literature reviews should follow a well-documented and repeatable data collection and data analysis process (Paré et al., 2015). First, the methodology of the study is presented in the following sub-chapters.

4.2.1 Data collection 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. This 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.

4.2.2 *Data analysis methodology*

The chapter 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. 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. 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 purely 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 or recommendations on governmental intervention at the early-stage venture financing market.

4.2.3 *Research questions*

Even though the aim of this study is to reveal the main research themes emerging from the governmental venture capital literature and to categorize the results along different dimensions, we can still formulate specific research questions and propositions employing our prior research knowledge.

Table 9: Research questions for chapter 4

RQ1: The articles in this research field are published in what quality Scimago-ranked journals?
RQ2: What are the main methodologies employed in the articles of the research field?
RQ3: What spurred the interest of researchers in the research field between 2000 and 2018?
RQ4: Which geographic area do the articles investigate?
RQ5: What are the main types of governmental intervention explored in the articles?
RQ6: How do the researchers evaluate the different types of interventions?
RQ7: Is there a type of intervention that researchers only associate with positive effects?
RQ8: Is there a link between the studied geographic area and the evaluation of the governmental intervention?
RQ9: What are the main recommendations for policymakers that the researchers propose?

Source: own editing

This chapter first focuses on the journals, methodologies, investigated geographic area and relevance of the published articles (RQ1-RQ4). Then the attention shifts to the different types of governmental intervention at the venture capital market in the next research questions. The aim is to identify the studied intervention methods (RQ5) and their evaluations by the articles (RQ6-RQ7). Since there can be differences in the results based on the geographic area where the data originates, it would also be of great interest to identify these possible differences (RQ8). Finally, this chapter also aims to summarize the recommendations of the authors for policymakers that can lead to better future governmental venture capital programs (RQ9). The next table contains the propositions that were formulated in connection with the research questions.

Table 10: Propositions for chapter 4

Proposition 1a: The articles of the research field were published in the highest quality Scimago-ranked journals (Q1-Q2).
Proposition 1b: The articles of the research field mainly employ econometrical analysis as research methodology.
Proposition 1c: The interest in the research field between 2000 and 2018 was mainly caused by the governmental response to different economic crises.
Proposition 1d: The articles mainly investigate the American governmental venture capital initiatives.

Proposition 2a: The articles mainly examine purely governmental venture capital and governmental-private partnership venture capital.
Proposition 2b: The articles primarily associate negative effects with direct governmental intervention.
Proposition 2c: The articles associate positive and negative effects in equal measure with public-private venture capital partnerships.
Proposition 2d: There is no intervention type that is only associated with positive effects.

Source: own editing

4.3 Classification and analysis of the database

This section presents the findings upon completing the classification of the articles. Descriptive statistics about the article database will give further insight and also show the identified research themes across the articles accompanied by their specific conclusions and investigated geographical area. The aim of this study is to establish the trends in the literature that deal with government intervention at the venture capital market.

4.3.1 Journals of the research field

Most of the articles investigating the governmental intervention at the venture capital market were published in 15 journals ranked Q1 or Q2 by Scimago (RQ1), this supports Proposition 1a – “The articles of the research field were published in the highest quality Scimago-ranked journals (Q1-Q2)”. Four journals published more than one paper. Three-four papers were released in Journal of Business Venturing and Venture Capital journal. Five papers appeared in European Planning Studies and two were published in Research Policy. 15 out of the 26 articles were published in Q1 ranked journals and most of the rest in Q2 ranked journalsm 1 publicaion in a Q3 journal. There are no articles published in Q4 Scimago ranked journals in the field of governmental venture capital between 2000-2018.

Table 11: Scimago ranking distribution of the research field

Journal name	Year	# of publications	Scimago ranking
European Business Organization Law Review	2014	1	Q2
European Planning Studies	2007	5	Q1
	2008		Q1
	2008		Q1
	2017		Q1
	2017		Q1
Global Economy Journal	2014	1	Q2
International Journal of Economics and Business	2007	1	Q2
Israel Affairs	2012	1	Q2
Journal of Business Venturing	2007	3	Q1
	2015		Q2
			Q1
	2016		Q1
Journal of Commercial Biotechnology	2011	1	Q3
Journal of Corporate Finance	2017	1	Q1
Journal of High Technology Management Research	2011	1	Q2
Journal of International Entrepreneurship	2009	1	Q2
Local Economy	2015	1	Q2
Research Policy	2014	2	Q1
	2018		Q1
Review of Finance	2015	1	Q1
Small Business Economics	2018	1	Q1
Technovation	2016	1	Q1
Venture Capital	2005	4	Q2
	2015		Q1
	2015		Q1
	2018		Q2
Total		15	Q1
		10	Q2
		1	Q3

Source: own editing

4.3.2 Databases and methodologies used in the articles

Let us analyze the research methodologies used in the articles (RQ2). The methodological approaches are quite varied within the field of governmental venture capital. Case studies (including comparative case studies) and econometric analyses are the most popular research methods featuring eight and ten articles within our database, indicating that econometric analysis is the most favored methodology in the research field, thus *Proposition 1b* – “The articles of the research field mainly employ econometrical analysis as research methodology” – finds support.

The popularity of case studies can be explained by the fact that certain authors are very familiar with the case of how governmental intervention shaped their country's startup ecosystem (Avnimelech et al., 2007; Avnimelech, 2008; Cohen et al., 2012) and it is the most suitable methodology to draw upon their large local experience with the subject. Also, data collection is especially difficult in this field. As Zangh (2014) highlighted: "it is quite difficult for an outside researcher to acquire the original contracts and agreements, either from venture capital or from its investees, which describe the application of these mechanisms among them. Under such circumstances, only indirect proof of these incentive mechanisms can be obtained by conducting interviews and consulting secondary sources." (112 p.).

Since one of the major research streams in this field is assessing the effectiveness of the governmental intervention, econometric analysis is also a favored method of researchers. The common approach of these articles is to get access to a large, preferably international database of companies and build a model to test the effect of governmental investments. They usually do this by building a model to explain the variable that the authors chose as the proxy for effectiveness of the examined portfolio companies. In these models the public investment is one of the explanatory variables and they test for whether it has a significant effect on the chosen effectiveness variable controlling for all other variables that can influence the response variable. It is thought-provoking that these articles come to different conclusions based on the kind of chosen effectiveness variable and based on the geographical source of their data.

One article contained a theoretical model for governmental intervention. This approach is very rare in the field, most likely due to the interest being focused on empirical findings on the state's role. Only one article employed solely questionnaire analysis, this can be attributed to the fact that it is hard to get responses in this field from institutions.

Table 12: Used methodology in the articles

Methodology	Articles employing the methodology	#
General equilibrium model	Bauer and Burghof, 2007	1
Case study	Cohen et al., 2012; Gill, 2015; Zhang, 2014; Avnimelech, 2008; Wonglimpiyarat, 2016	5
Comparative case study	Wonglimpiyarat, 2011; Avnimelech et al., 2007; Baldock and Mason, 2015; Heger et al., 2005	4
Questionnaire analysis	Bilau et al., 2017, Frenkel et al., 2008	2
Mixed research methods	Tucker et al., 2011; Karsai, 2018; Wray, 2015	3

Q methodology	Jung et al., 2017	1
Econometric analysis	Herrera-Echeverri et al., 2014; Standaert and Manigart, 2017; Grilli and Murtinu, 2014; Cumming et al., 2017; Guerini and Quas, 2016; Alperovych et al., 2015; Cumming and Johan, 2009; Milosevic, 2018; Brander et al., 2015; Cumming, 2007	10

Source: own editing

Seventeen (Heger et al. 2005; Bauer & Burghof 2007; Cohen et al. 2012; Gill, 2015; Avnimelech, 2008; Tucker et al., 2011; Avnimelech et al., 2007; Herrera-Echeverri et al., 2014; Wonglimpiyarat, 2016; Grilli and Murtinu, 2014; Cumming et al., 2017; Guerini and Quas, 2016; Alperovych et al., 2015; Cumming and Johan, 2009; Milosevic, 2018; Brander et al., 2015; Cumming, 2007) out of the 26 articles used only secondary data to carry out their research. These were mainly quantitative data from publicly available databases, reports from research institutions, associations, committees or banks and studies made by other researchers. Considering the large number of econometric studies, it is not surprising that secondary data is so prevalent in this field. Also, it is difficult to get primary data from governmental investors.

4.3.3 Relevance of the articles

By reading through the articles, two major research streams can be identified across all articles: the reason for government intervention and the effect of government intervention (see Figure 13). Despite the fact that several reports and studies are written worldwide each year regarding the reason and efficiency of the government intervention at the venture capital market, still only 26 articles were published in Scimago Ranked journals between 2000-2018. All the papers published in Scimago ranked journals underwent a strict review process. Investigating why these papers were selected for publication, what spurred the scientific interest in the research field (RQ3) are interesting questions for every researcher. Most of the articles possess high relevance because of a financial crisis. These articles investigated the market changes, and in that respect the government response to the crisis and/or the efficiency of the governmental intervention.

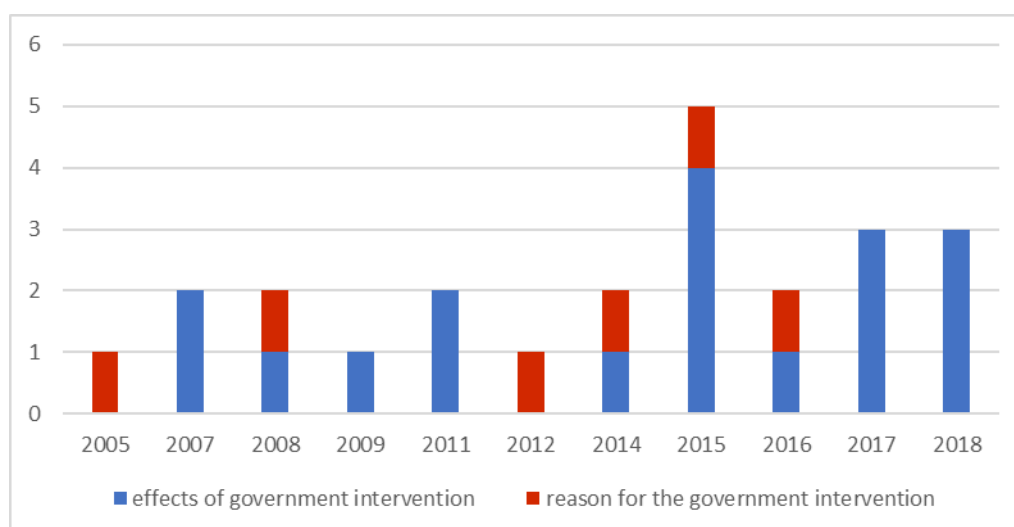
- **The dot-com crisis of 2000** heavily impacted the technological industry and the young technological start-ups too. Heger et al. (2005) gave a historical overview between 1990-2005 on the UK and the German venture capital market and the role of the government. Frenkel et al. (2008) studied the Israeli venture capital market, as public technological incubators began operating in Israel in 2000 right after the dot-

com crisis. Frenkel et al. highlighted the importance of the PTIP (Public Technological Incubator Program) at the Israeli venture capital market. The paper of Avnimelech (2008) is based on the same premise, but he focuses on the startup ecosystem as a whole and studies the innovation and technology policy in Israel. The motivation of Avnimelech et al. (2007) and Wonglimpiyarat (2016) is extended also by the success of the Israeli Yozma program, while Cohen et al. (2012) deals primarily with the Office of the Chief Scientist program.

- After the beginning of the **2008 global financial crisis** several authors phrase recommendations for the government of their investigated country such as Wonglimpiyarat (2011) to the Thai, Cohen et al. (2012) to the Israeli, Zhang (2014) to the Chinese and Gill (2015) to the British. A group of articles analyzed the governmental response to the crisis by various countries. Bilau et al. (2017) analyzes the governmental response in Portugal to the 2008 crisis focusing on the support of business angels, Baldock and Mason (2015) and Wray (2015) deals with the UK response. The EU venture capital programs provided the relevance to the articles of Karsai (2018) and Grilli and Murtinu (2014). The Australian governmental venture capital programs inspired the work of Cumming and Johan (2009). In conclusion most articles investigated governmental initiatives which were a response to an economic crisis, thus *Proposition 1c – “The interest in the research field between 2000 and 2018 was mainly caused by the governmental response to different economic crises” – finds support.*

There are also two outliers. Bauer & Burghof (2007) investigated the government measures from a theoretical point of view. A merely theoretical basis forms the motivation for the article of Herrera-Echeverri et al. (2014) as well, since they want to uncover whether neoclassical or Keynesian theories on governmental intervention are beneficial for emerging markets when it comes to the health of the venture capital industry.

Figure 13: Identified research streams over the years



Source: own editing

4.3.4 *Origin of the author in relation to the investigated geographic area*

It is important to note that 26 authors are from one of the European universities. Six of them from the United Kingdom and five from German or Italian universities. There are also authors from France, Belgium, Portugal, the Netherlands, and Hungary. These researchers gave thorough analyses of the European venture capital market. The other 30 authors are not from Europe. 10 of them are researchers from Israel who gave an introduction to the motivations, methods and efficiency of the Israeli government. There were eight researchers from Canada, three from both Korea and the USA, two from both Thailand and Colombia, and finally one from both Australia and China.

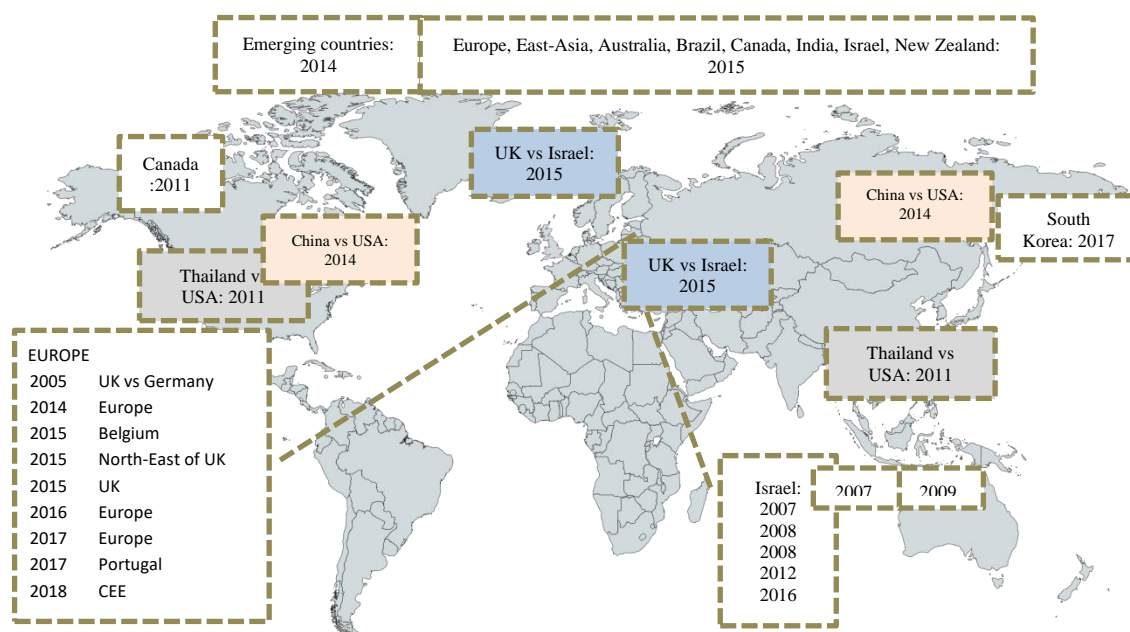
Nine out of the 26 articles were written in cooperation by researchers originating from different countries (Heger et al., 2005; Cumming and Johan, 2009; Herrera-Echeverri et al., 2014; Alperovych et al., 2015; Brander et al., 2015; Guerini & Quas, 2016; Bilau et al., 2017; Jung et al., 2017; Cumming et al., 2017). Five out of the nine articles investigated the European market. Regarding the date of the publication, the earliest article (Heger et al., 2005) was written by European researchers from different countries investigating the public funds in the UK and Germany in cooperation with the Centre for European Economic Research and the University of Exeter. Jung et al. (2017) studied the south Korean venture capital market in a cooperation with the Seoul National University and the Southern Illinois University. Cumming and Johan (2009) investigated the venture capital market in Australia even though the authors are from

Canada and the Netherlands. Two papers investigated worldwide trends (Herrera-Echeverri et al., 2014; Brander et al., 2015).

Comparing the origin of the author's research institution (such as a university or an institute) and the investigated country – excluding articles written in an international cooperation – we found that they are equivalent except in five cases. Zhang (2014) from the Korea University Law School studied “*the incentive mechanisms in the operation of Chinese domestic venture capital, [and] compared to American venture capital experience.*” (107 p.). Cumming (2007) from New York investigated the Australian venture capital market, meanwhile Wray (2015) from Australia investigated the North-East of England. Wonglimpiyarat (2016) from Thailand analyzed the Yozma program in Israel. Wonglimpiyarat proposes that knowing this program can be useful for other countries which aim to develop their high-tech startup ecosystem.

Figure 14 shows how the papers are distributed over their investigated geographic area. The majority of the articles only dealt with data from a single country. Most articles examined data from only the EU, and surprisingly only two articles investigated the United States – which possess one of the most mature venture capital market – thus *Proposition 1d – “The articles mainly investigate the American governmental venture capital initiatives” – is not supported.* The most popular countries under investigation were the UK and Israel. Among papers investigating the European Union, five articles investigated several EU countries and four articles focused on one individual country such as France, Belgium, Germany or Portugal. On the other hand, several papers studied the Israeli market, some of them consider the Israeli Yozma program to be an example worth following. A few of them investigated the Asian, Canadian and Australian markets. Herrera-Echeverri et al. (2014) investigated the effects of foreign direct investment, institutional quality, and the size of the government on venture capital activity at the emerging markets. They concluded that governmental spending affects adversely the activities of the venture capital actors.

Figure 14: Distribution of the articles over their investigated geographic area



Source: own editing

Based on Figure 14, it can be stated that analyzing these articles can lead to a global overview on the main trends of governmental interventions at the venture capital market.

4.4 Research questions in relation to the investigated geographic area and time period

The papers differ from each other slightly in their research questions, meanwhile all of them are searching for the optimal level and way of the governmental intervention. Therefore, their conclusions can be useful worldwide for researchers and policymakers. This section explores the different research questions and their connection to the investigated geographic area and time period.

Table 13: Investigated geographic area and time period

Geographic area	Reference	Investigated geographic area	Investigated time period
Europe	Heger et al. (2005)	UK vs Germany	1990-2005
	Cumming et al. (2017)	Belgium, Finland, France, Germany, Italy, Spain, UK	1991- 2010
	Guerini & Quas (2016)	Europe	1993-2010
	Grilli & Murtinu (2014)	European Union	1994-2011
	Alperovych et al. (2015)	Belgium	1998-2007
	Milosevic (2018)	Europe, France	2005-2013

	Karsai (2018)	CEE region	2007-2013
	Bilau et al. (2017)	Portugal	2008-2012
	Standaert & Manigart (2018)	Belgium	2005-2009
	Wray (2015)	North East of England	2012
	Baldoc & Mason (2015)	UK	2000-2014
	Gill (2015)	UK vs Israel	1945-2014
Israel	Avnimelech (2008)	Israel	1969-2005
	Frenkel et al. (2008)	Israel	1990-2002
	Wonglimpiyarat (2016)	Israel	1990-2012
	Avnimelech et al. (2007)	Israel	1991-2004
	Cohen et al. (2012)	Israel	2000-2010
Asia	Jung et al. (2017)	South Korea	2015
	Zhang (2014)	China vs USA	1997-2010
	Wonglimpiyarat (2011)	Thailand, USA	2010
Australia	Cumming & Johan (2009)	Australia	1982-2005
	Cumming (2007)	Australia	1982-2005
Canada	Tucker et al. (2011)	Canada	2001-2010
Worldwide	Brander et al (2015)	worldwide	2000-2012
	Herrera-Echeverri et al. (2014)	emerging markets	1996-2010
Theoretical	Bauer & Burghof (2007)	-	-

Source: own editing

4.4.1 Europe

Twelve articles studied the European region. The government's role in early-stage capital investments in the UK was studied by several papers. The earliest publication in our database is Heger et al. (2005) who investigated the public funds in the UK and Germany between 1990-2005. The governmental interventions in the UK were examined by several researchers. Gill (2015) wanted to identify the key governmental measures required to rebuild the venture capital sector of the UK. He analyzed the UK government intervention historically between 1945-2014 and took into consideration the Israeli Yozma program as an example worth following. The actuality of the investigation was the recent creation of the British Business Bank which received EU state-aid to promote early-stage risk capital. Baldock and Mason (2015) investigated also the efficiency of the UK governmental programs between 2000-2014. Wray (2015) wanted to uncover how three processes unfolded in the UK in 2012: state rescaling, recessionary conditions, and business support reforms.

Several papers investigating the European region posed the question of whether governmental venture capital-private venture capital partnership initiatives proved to be

effective or not, but they got their data from different geographical locations and use a different definition for success. Standaert et al. (2018) wanted to find out whether the government achieved its goal in Belgium through governmental venture capital-private venture capital partnership where the goal is defined as the employment growth of investee companies in the timeframe of October 2005 to December 2009. Karsai (2018) was interested in the quality of governmental venture capital-private venture capital programs in the CEE region that were financed by the EU between 2007-2013.

A group of articles wanted to directly compare purely governmental venture capital and purely private venture capital financing in terms of effectiveness, but again, on different data sets and using different measures. Grilli and Murtinu (2014) wanted to compare governmental venture capital and private venture capital investments in the EU between 1994-2011 in terms of their effect on the sales growth and employment growth of target companies using the VICO database. A very similar study was done by Cumming et al. (2017) using the same dataset for the period of 1991-2010 but looking at the exit possibilities of target companies. Still using the same dataset for the period of 1993-2010, Guerini and Quas (2016) placed the emphasis on the differences between governmental venture capital and private venture capital in terms of the target selection capabilities in the EU. Alperovych et al. (2015) defined success as productivity and compared Belgian governmental venture capital and private venture capital investment targets between 1998-2007.

There are papers which investigated specific problems in a particular European country. Bilau et al. (2017) aimed to uncover whether business angels continue to invest during an economic crisis and how successful were policies of Portugal in promoting angel investing in the critical times of 2008-2012. Milosevic (2018) wanted to find out how social capital of venture capital managers affects the success of target companies. He focused on France and the timeframe was 2005-2013.

4.4.2 Israel

Six articles investigated the Israel Venture Capital market. Frenkel et al. (2008) studied the basic differences in characteristics between public and private technological incubators in Israel between 1990-2002. Cohen et al. (2012) assessed the Israeli OCS programs and their evolution between 2000-2010, while Avnimelech (2008) presents the evolution of innovation and technology policy in the country between 1969-2005. Later, Avnimelech et al. (2007) focused on the impact of venture capital and

technological incubator support on the efficiency and development of Israeli startups in the period of 1991-2004. Gill (2015) compared the structured risk venture activity of the UK Business Bank partly to the Israeli Yozma model, however without citing Frenkel et al. (2008) and Cohen et al. (2012) who introduced the Israeli venture capital market and government policy. Wonglimpiyarat (2016) also examines Israel between 1990-2012, particularly, how the governmental efforts helped to shape the ecosystem and venture capital industry.

Based on these articles we get a broad overview from 1969 to 2010 of the Israeli governmental programs promoting the venture capital industry which are accepted by the authors as successful examples. Gill (2015) considers the Israeli a useful and successful model to be followed by the UK's government as well.

4.4.3 Asia

Three papers investigated venture capital markets in Asian countries (China, South Korea, and Thailand). Two papers compared government measures. Zhang (2014) explores the Chinese corporate governance of SCLCs from the adaptive efficiency point of view between 1997-2010. He stated that the American model proved to be successful in fostering external innovation. Wonglimpiyarat (2011) examined Thailand's institutional setting, financial innovation system, innovation financing policies and technology financing mechanism effects on the innovation capacities, innovation outcomes, and the companies' abilities to pursue innovative ventures in 2010. He found that the US Silicon Valley model is an ideal institutional framework. He stated that the government should support the high-tech startups by providing financial incentives in the form of loans, equity, grants, tax subsidies.

The third paper written by Jung et al. (2017) is focused on the different stakeholder perspectives surrounding the Centers for a Creative Economy and Innovation in South Korea in 2015. These three articles give us an insight into the venture capital market of three Asian countries and their specific problems regarding venture capital investments.

4.4.4 Australia

Two articles studied the Australian venture capital market. Similarly to the papers investigating the European market, these articles too pose the question of whether governmental venture capital-private venture capital partnership initiatives proved to be

effective or not. Cumming (2007) aims to find out whether the governmental venture capital-private venture capital program of Australia proved to be successful compared to other venture capital funds. Cumming and Johan (2009) compared the success of an early-stage Australian governmental venture capital-private venture capital program with other governmental programs. These two articles broaden our knowledge geographically about the effectiveness of the partnership between the public and the private sector promoting young entrepreneurs to succeed at the venture capital market.

4.4.5 Canada, USA, Worldwide

One paper examined the Canadian government and two papers have a broader geographic coverage. Tucker et al. (2011) were interested in finding out the structural problems that cause the life science sector to underperform in the otherwise well performing Canadian venture capital industry. The USA' venture capital model appeared in several papers as exemplary (Zhang, 2014; Wonglimpiyarat, 2011). Herrera-Echeverri et al. (2014) looked at how different macro variables and governmental intervention effect the level of venture capital activity in emerging countries. Brander et al. (2015) examined governmental venture capital and private venture capital investments on a worldwide dataset regarding the exit possibilities

Bauer and Burghof (2007) wrote a theoretical paper which does not concentrate on a specific geographical region. The paper does not use empirical analysis or data to test their model. They investigate how the state should spend money to generate the most amount of additional private investment in a theoretical way. To this end, they analyzed the effect of state subsidies on early stage investments in a two-period investment model.

4.5 Results of the content analysis

In this section, the results of the content analysis are presented which looked for observations about the government's role in the early-stage venture financing market. The in vivo codes were classified into themes that represent the type of involvement that the government is taking part in. The findings are presented along these main themes, which contain sub themes that separate the positive evidences of the main theme from the negative evidences. The presentation of the results in each main theme starts by an explanation of the theme characteristics. This section aims to show the researchers' evaluation of these governmental intervention types and to answer RQ5-RQ9.

4.5.1 Purely governmental venture capital (direct intervention)

One of the most direct ways of intervening at the venture capital market by the government is to set up its own fund manager that manages state provided funds. This is what we call purely governmental venture capital, as no private actors are involved in this type of financing, the government manages its own funds. The positive and negative evidences of purely governmental venture capital financing are now presented based on the content analysis. There were 24 in vivo codes that represent purely governmental venture capital in a positive way, and 24 in vivo codes that represent it negatively. The debate is very heated on this form of governmental intervention and there is a great variance of results depending on the geographical area of the used database.

Table 17 includes the categories that show the positive evidences of purely governmental venture capital intervention. 10 articles contain positive evidences out of the 19 articles analyzing this theme. The results of studies investigating the EU are mixed when it comes to evaluating purely governmental venture capital initiatives, while the results coming from Israel, the USA, Thailand and South Korea are strictly positive.

Table 14: Positive evidences of purely governmental venture capital

Relevant sources used	Category	# of in vivo codes	Geographic area
Bauer, Burghof (2007); Wonglimpiyarat (2011); Cohen, Gabbay, Schiffman (2012); Jung, Eun, Lee (2017); Baldock, Mason (2015); Brander, et al. (2015); Wonglimpiyarat (2016); Karsai (2018); Guerini, Quas (2016)	Governmental venture capital complements private venture capital	6	Israel, UK, EU
	Governmental venture capital promotes getting private venture capital investment	6	EU
	Governmental venture capital stimulates the economy	3	Thailand, USA, UK
	Governmental venture capital does not crowd out private venture capital	2	Israel, CEE
	Governmental venture capital fills the financing gap	2	Thailand, USA
	Governmental venture capital helps to recover from the global financial crisis	2	UK
	Governmental venture capital is efficient	2	Europe
	Governmental venture capital can induce and stimulate private actors	1	South Korea
	SUM	24	

Source: own editing

There is a group of articles that found governmental venture capital to complement private venture capital investments. Cohen, Gabbay, Schiffman (2012) highlighted that public funding of R&D complements the private venture capital funding in the Israeli high-tech industry and there is a strong consensus in that issue. Baldock and Mason (2015) examined the governmental venture capital efforts of the UK and found them to be complementary to private venture capital financing. Furthermore, they found that governmental venture capital stimulated the economy of the UK through employment generation. Finally, Brander et al. (2015) found on an international dataset that governmental venture capital funding increases the total amount of venture capital funding available to companies, thus there is no crowding-out effect. According to them, many startups that receive governmental venture capital would not have received private venture capital at all. This also suggests, that governmental venture capital fills the funding gap. They also found that while purely governmental venture capital investments have poor exit performance in the US, there is evidence to the contrary in Europe. On the other hand, the reason why governmental venture capital investments do not crowd out private venture capital investments in the CEE region according to Karsai (2018) is that there is a shortage of private investors in the region to begin with.

Based on a theoretical analysis, Bauer and Burghof (2007) proved that state intervention is the most effective when it is designed to use scarce state money meanwhile mobilizing private capital, its role is essentially to promote getting private venture capital investment. Wonglimpiyarat (2016) also found that governmental venture capital investments in Israel did not crowd out, but crowd in private investments. The study of Guerini and Quas (2016) concluded, that since governmental venture capital funding increases the likelihood that companies will receive private venture capital, governmental venture capital investors must be skilled at selecting target investments and certifying them to private venture capital investors through reducing informational asymmetry; thus, they found governmental venture capital to be efficient.

Government intervention can stimulate the economy according to Wonglimpiyarat (2011) based on the investments at the US market. The author found that the US government financing programs promote the economic performance of the US and fill the funding gap of innovative projects on a short-term and long-term basis specifically at the beginning of the innovation life cycle. Jung et al. (2017) believe that the main role

of governmental venture capital is to stimulate the development of the startup ecosystem of South Korea.

There are two articles that found governmental venture capital to crowd out private venture capital. Only one of them made this claim based on empirical analysis. Using an emerging markets database, Herrera-Echeverri et al. (2014) found that government spending – including governmental venture capital – has a negative effect on private venture capital activity, and the best way for the government to support the venture capital sector is to improve institutional quality and reduce spending. Bauer and Burghof (2007) built a theoretical model which indicated that large amounts of state intervention can crowd out private money. Milosevic (2018) found agency problems associated with governmental venture capital in France.

Furthermore, there is considerable international evidence indicating that governmental venture capital is less efficient than private venture capital. Tucker et al. (2011) cites the poor returns of Canadian governmental venture capital investments as a reason to maintain only minimal government involvement and transition to mostly private venture capital funding. They also add that despite being inefficient, Canadians governmental venture capital investments still helped to generate a critical mass of life science industry activity. European data also supports this, showing private venture capital investee companies to have better exit opportunities than governmental venture capital investees (Cumming et al., 2017). The results of Alperovych et al. (2015) point to a similar direction, they found that Belgian governmental venture capital investments have a significant negative impact on the productivity of the target companies. The inability of governmental venture capital financing in the EU to foster sales growth in target companies was found to be a consequence of the lack of value-added skills of governmental venture capital investors by Grilli and Murtinu (2014). Cumming and Johan (2009) also criticize Australian governmental venture capital programs for showing mixed performance associated with the provided financing and governance. Exit performance was also cited as a sign of inefficiency by Brander et al. (2015), who found a negative association between exit performance and governmental venture capital funding in the USA. Standaert and Manigart (2018) found governmental venture capital investors to be worse at selecting prospective investments than private venture capital investors in Belgium; therefore, they suggest that governmental venture capital investors should let private venture capital investors select target companies for them (governmental venture capital-private venture capital partnership), which would lead to

more employment growth. In conclusion, the evaluation of direct involvement is mixed in the literature, thus *Proposition 2b* – “*The articles primarily associate negative effects with direct governmental intervention*” – *is not supported* as the literature doesn’t associate mainly negative effects with direct governmental intervention.

Table 15: Negative evidences of purely governmental venture capital

Relevant sources used	Category	# of in vivo codes	Geographic area
Alperovych, Hübner, Lobet (2015); Brander, et al. (2015); Cumming, Grilli, Murtinu (2017); Grilli, Murtinu (2014); Herrera-Echeverri, Haar, Estevez-Bretón (2014); Karsai (2018); Milosevic (2018); Standaert, Manigart (2018); Tucker, Chakma, Fedak, Cimini (2011); Bauer, Burghof (2007)	Governmental venture capital crowds out private venture capital	5	emerging markets
	Governmental venture capital has agency problems	1	France
	Governmental venture capital is less efficient than private venture capital	5	Canada, Europe, Belgium
	Governmental venture capital cannot support efficiently the targets	4	EU, Belgium
	Governmental venture capital is inefficient	4	USA, Canada, CEE, Australia
	Governmental venture capital selects worse than private venture capital	4	Belgium
	The impact of governmental venture capital alone appears to be negligible	1	EU
	SUM	24	

Source: own editing

4.5.2 Governmental venture capital-private venture capital partnership

There is two major ways the government can enter a partnership with private actors when it comes to providing financing to startup companies. One way is to provide state funds that will be managed entirely by the private venture capital fund management (hybrid financing, indirect intervention). Even this type of partnership generally requires the private venture capital partner to provide a minor part of the managed funds. It is also possible for the state to affect the investment decision process by delegating managers to the fund management company to have some control over the kind of investments the fund will make. The other major way of public-private partnership is when a startup receives investments from both private and public venture capitalists. This can happen at the same time (co-investment) or delayed. The analyzed

literature examines examples from all these types of partnerships, which will be presented separated into positive and negative evidences on the subject.

Several articles found that governmental venture capital complements private venture capital. Grilli and Murtinu (2014) examining EU data found that government involvement can have a positive impact on firm growth in a governmental venture capital-private venture capital partnership investment only if the private investor is the leading partner of the syndicate. They found the Australian co-investment model of IIFs to be an effective approach. However, using worldwide international data, Brander et al. (2015) found that the presence of governmental investors in these partnerships can enhance the selection of prospective portfolio companies compared to a purely private venture capital investment.

There is also a group of articles which found that investments made by this partnership have more positive impact on portfolio companies then either governmental venture capital or private venture capital investment. Standaert and Manigart (2018) observed this positive impact in Belgium as greater employment growth. Using EU data, Cumming et al. (2017) found this positive effect to be a greater likelihood of exit. This greater chance of exit is supported by Brander et al. (2015), who examined an international dataset, and also found that enterprises funded by governmental venture capital-private venture capital partnerships obtain more investment then purelyly governmental venture capital or private venture capital investees. Furthermore, they came to the conclusion that the governmental partner must also emphasize the financials when selecting portfolio companies rather than the externalities.

Gill (2015) found that the government's intervention advanced significantly in the UK regarding the so called 'hybrid public-private' form. The improvement is observable in the design and targeting of the programs and in the cost effectiveness of the local investments.

Table 16: Positive evidences of governmental venture capital-private venture capital partnership

Relevant sources used	Category	# of in vivo codes	Geographic area
Grilli, Murtinu (2014); Brander, et al. (2015); Standaert, Manigart (2018); Gill	Governmental venture capital complements private venture capital	4	UK, worldwide
	Governmental venture capital-private venture capital funds are managed better by private actors	2	EU
	Governmental venture capital-private venture capital has better selection	1	worldwide

(2015); Cumming et al. (2017)	criteria than private venture capital		
	Governmental venture capital-private venture capital has more positive impact than purely governmental venture capital or private venture capital	8	Belgium, Europe, worldwide
	The selection criteria of governmental venture capital-private venture capital are based on financials.	1	worldwide
	Governmental venture capital-private venture capital fosters the development of the venture capital industry	1	EU
	SUM	17	

Source: own editing

Karsai (2018) warns about the agency problems present in governmental venture capital financing in the CEE region. She further criticized these programs for being over-engineered. She cited the long set-up times, insufficient fund sizes as contributing factors. She also criticized the authorities in charge of the programs for not enforcing the regulations on the participating fund managers and for not initiating thorough evaluations after the end of the programs. Furthermore, in her opinion, the short timeframes of the programs lead to hasty investment decisions by the relatively inexperienced fund managers and to absorption pressure. Based on Australian data, Cumming and Johan (2009) also points out that the main challenge of governmental venture capital programs is the selection of the fund managers.

Jung et al. (2017) also criticized the bureaucratic barriers in South Korea, which inhibit the effective cooperation between governmental venture capital and private venture capital investors. Gill (2015) found evidence of governmental venture capital-private venture capital inefficiency since mismatches between the supply and the demand still persist causing significant opportunity costs to the UK economy. In conclusion, the examined articles associated the public-private venture capital partnerships slightly more with positive effects than with negative ones, thus *Proposition 2c – “The articles associate positive and negative effects in equal measure with public-private venture capital partnerships” – is partly supported.*

Table 17: Negative evidences of governmental venture capital-private venture capital partnership

Relevant sources used	Category	# of in vivo codes	Geographic area
Jung, Eun, Lee (2017); Karsai (2018); Gill (2015); Cumming, Johan (2009)	Governmental venture capital-private venture capital programs suffer from agency problems	2	CEE, Australia
	Governmental venture capital-private venture capital programs are highly over-engineered	3	CEE
	Governmental venture capital-private venture capital programs lack supervision	2	CEE
	Governmental venture capital-private venture capital programs suffer from absorption pressure	1	CEE
	In governmental venture capital-private venture capital, the private fund managers are inexperienced	1	CEE
	Governmental venture capital-private venture capital cooperation is problematic	1	South Korea
	Governmental venture capital-private venture capital is inefficient	2	UK
	Sum	12	

Source: own editing

4.5.3 *Governmental venture capital intervention at pre-seed financing*

The pre-seed phase presents a special case of startup financing, as these investments bear the highest amounts of risk due to the company possessing only an idea at this stage. The governments usually target this phase by providing financial support for incubators and business angels. Since this was identified as a separate theme in addition to the themes connected to the venture capital interventions, *Proposition 2a* – “*The articles mainly examine purely governmental venture capital and governmental-private partnership venture capital*” – *is partly supported*, as the majority of the articles indeed dealt with the purely governmental venture capital and governmental-private partnership venture capital, but a smaller section examined the pre-seed initiatives. In this section, the findings are presented on whether these initiatives are perceived as successful in the literature or not.

Based on the content analysis, 34 thought-units could be identified with positive remarks on the government intervention and only two negative thought-units. Startups in the pre-seed phase lack any kind of track record, which makes investing in them much riskier than investing in later stage startups. This lack of financial information

drives the market failure of asymmetric information. Therefore, the government intervention can be justified the most in the pre-seed phase.

Six out of the 26 authors gave positive remarks on the governmental venture capital intervention at the pre-seed financing phase. These were classified into four categories. Geographically, the positive comments originated from five different areas: Israel, Portugal, the EU, Australia and the UK. Table 21 shows the number of thought-units along the categories.

Table 18: Positive evidences of governmental venture capital intervention at pre-seed financing

Relevant sources used	Category	# of in vivo codes	Geographic area
Frenkel et al. (2008); Avnimelech, Schwartz, Bar-El (2007); Bilau, Mason, Botelho, Sarkar (2017); Cumming, Johan (2009); Grilli, Murtinu (2014); Wonglimpiyarat (2016)	Private incubators cannot substitute fully for public incubators	10	Israel
	Governments finance BAs/incubators	8	Israel, Portugal, EU, Australia
	Public technological incubators can support the venture capital industry	11	Israel, UK
	Governments promote innovation	5	Israel
	SUM	34	

Source: own editing

The Israeli model regarding the public technological incubator program became an example worth following by other countries as well. Between 1990 and 1993, the Israeli government established 28 incubators as a response to the wake of the large influx of immigrants providing the Israeli high-tech industry with highly skilled labor. One and a half decade later Frenkel et al. (2008) investigated whether there is still a need for the public intervention, or the private sector could take over its role. The authors emphasized that private incubators cannot substitute fully for the public incubators. On the one hand, public incubators sponsor a large variety of activities and provide a personal, intensive support system from the very early stage, unlike private incubators who concentrate in selected industries and cannot offer an intensive support system. Furthermore, the public technological incubator program supports national objectives such as regional development and sponsor new immigrants in Israel. Additionally, the government sponsors high-risk projects which are non-attractive for private investors or operating in sectors where private investors choose not to operate.

There were 8 positive remarks associated with the government financing of business angels or incubators. Public incubators ensure stability for long-term planning and supply a safe framework. Frenkel et al. (2008) also stated that there was a gap between supply and demand to fill so the government needed to intervene at different levels. In Portugal, the government places substantial emphasis on supporting the business angels to promote early-stage startups. The government provides business angels with funding that can be spent through a co-investment scheme. The business angels in Portugal expressed that they prefer this type of governmental intervention (Bilau et al., 2017). Avnimelech et al. (2007) found that venture capital backed companies that priorly received support from governmental incubators had significantly improved results over those, which did not. Cumming and Johan (2009) praised the Australian governmental pre-seed funds for being the primary provider of seed stage financing in the country.

One of the main advantages of public technological incubators is that they can support the venture capital industry. Frenkel et al. (2008) mentioned as a positive sign that public incubators support the highly skilled immigrants in Israeli high-tech sector; the public incubators can also increase export and develop the periphery. The need for public incubators is justified by the fact that private investors won't invest in such a risky, early R&D stage company. Moreover, public incubators can encourage private investment in the fields in which it would not otherwise venture. Avnimelech et al. (2007) also points out that public technological incubators can have positive effects on the venture capital industry by reducing the drawbacks inherent in the venture capital sector.

Finally, some authors mentioned as a positive effect that governments promote innovation: Frenkel et al. (2008) stated that public incubators promote the knowledge transfer between the academy and industry, while helping a wide range of startups in the high-tech industry to get the opportunity to work on their idea. Wonglimpiyarat (2016) found that the Israeli governmental programs – such as the Yozma program – along with the technological incubators and supporting university R&D projects played a major role in making the country a high-tech powerhouse.

Frenkel et al. (2008) set out numerous advantages for public incubators in Israel meanwhile they come up with a few disadvantages as well. Firstly, it is undeniable fact that in some domains the private incubators can better support the early stage companies than can the public ones. Secondly, venture capital funds prefer projects that are

supported by private incubators than projects supported by public ones. As these articles contain overwhelmingly positive remarks associated with the government's efforts in pre-seed financing, *Proposition 2d* – “*There is no intervention type that is only associated with positive effects*” – is unsupported.

Table 19: Negative evidences of governmental venture capital intervention at pre-seed financing

Relevant sources used	Category	# of in vivo codes	Geographic area
Frenkel et al. (2008);	Venture capital funds tend to invest more in projects within private incubators than public incubators	1	Israel
	Private incubators supply better services than do public ones	1	Israel

Source: own editing

4.5.4 Summary on the recommendations of the literature

Several authors also formulated recommendations about how the government could improve on its efforts to intervene at the venture capital market which are now explored in detail (RQ9). These recommendations vary in tone and constructiveness. 42 thought-units could be identified in 12 out of the 26 articles that formulate recommendations about how the government should intervene. There were recommendations associated with every geographic area under investigation. These were classified into 11 categories (see table 23).

Table 20: Recommendations for government intervention

Relevant sources used	Category	# of in vivo codes	Geog.
Bilau, Mason, Botelho, Sarkar (2017); Cumming, Johan (2009); Avnimelech, Schwartz, Bar-El (2007); Grilli, Murtinu (2014); Herrera-Echeverri, Haar, Estevez-	Governments should complement private venture capital and not compete with it	10	Israel, UK, Thailand
	Governmental venture capital funds should not compete with each other	5	Australia, Canada, Thailand, USA
	Governmental venture capital should provide early to late stage investment	5	Canada, UK, Thailand, USA, Israel

Bretón (2014); Tucker, Chakma, Fedak, Cimini (2011);Bauer, Burghof (2007); Cohen, Gabbay, Schiffman (2012); Frenkel et al. (2008); Gill (2015); Wonglimpiyarat (2011); Zhang (2014)	Governments need to apply incentives	4	Portugal, EU, Thailand, USA, China
	Institutional quality can substitute for governmental venture capital	4	emerging markets
	Peripheral questions	3	Israel, UK, Germany
	Governments should not impact the shareholders meeting.	5	China
	Government's funds should be of sufficient scale	3	UK, Thailand, USA
	Educate entrepreneurs	1	Portugal
	Governments should reduce the venture capital industry's dependence on foreign financing	1	Israel
	Labor-sponsored funds should not be employed	1	Canada
	Sum	42	

Source: own editing

One of the most important recommendation made by the authors was that the governments should complement private actors in the venture capital industry and under no circumstances compete with them. Gill (2015) stated that state should participate in the rebuilding of the UK's venture expertise meanwhile it should take care not to act as a private investor. Wonglimpiyarat (2011) emphasized that the Thai government should play a catalytic role for industry development at the beginning, but in the long-term should facilitate the private sector to lead and drive the economy. Bauer and Burghof (2007) added that the state should only interfere in the case of an apparent market failure. Some industries depend more on state support such as private biotechnology incubators (Frenkel et al., 2008). The government participation should be limited to some fields and some specific locations, especially peripheral regions (Frenkel et al., 2008). Since the private sector possesses better business knowledge and vision, a cooperation between the private and public sector could be useful. Consequently, the public sector should not exit completely from the early-stage sector.

Governmental venture capital funds should not compete with each other. Investigating several countries such as Australia (Cumming and Johan, 2009), Canada (Tucker et al., 2011), Thailand (Wonglimpiyarat, 2011), the authors noticed that the

government provides similar programs and initiatives which compete with each other. The reason could be that state authorities are following multiple goals and the separated governmental institutions are announcing overlapping programs. Tucker et al. (2011) pointed out that multiple government funding agencies should merge to benefit from economies of scale. Wonglimpiyarat (2011), Cumming and Johan (2009) and Bauer and Burghof (2007) also stated that similar state programs with competing objectives are inefficient because they are crowding out one another. The government venture capital programs should be designed to be complementary.

Governmental venture capital should provide early to late stage investment. Long-term governmental financial support is in demand worldwide. Tucker (2011) focused on the biotechnology industry in Canada and found that the government should invest in the companies from early to late stage to increase its success and to leverage against international investors. Gill (2015) in the UK and Wonglimpiyarat (2011) in Thailand added that the state's support should be structured for the long term. Cohen et al. (2012) in Israel highlighted that the state should approve funding for more than one year at a time.

Governments need to apply incentives. Wonglimpiyarat (2011) investigated the USA market and found quite similar recommendations for the Thai and the Chinese government to follow. Tax incentives and positive policy initiatives should be used as part of a comprehensive innovation financing program in Thailand to stimulate entrepreneurial investment in the economy. The research of Bilau et al. (2017) also points to this direction, stating that Portuguese business angels prefer the government to use fiscal incentives to encourage investments such as reinvestment relief and tax relief. Similarly, Grilli and Murtinu (2014) advocate for an indirect governmental support through measures such as tax reliefs.

Institutional quality can substitute for governmental venture capital. A very different perspective is presented by Herrera-Echeverri et al. (2014). The authors used econometric methods on an emerging markets dataset and found that the venture capital investment activity in a country was a positive function of institutional quality and a negative function of direct government involvement. Their recommendation to governments is to focus on developing their institutions and then the conditions will be set for a thriving private venture capital ecosystem that requires only minimal governmental venture capital investment.

The authors mentioned the peripheral problems of Israel, Germany and UK. Centralized measures cannot solve regional problems. Heger et al. (2005) suggested that the regional involvement of the institutions could handle the regional allocation of the needed financial programs. Avnimelech et al. (2007) also pointed out that governmental technological incubators were successful in attracting investments to the peripheral areas of Israel, even if their success rates are modest.

Zhang (2014) focused on the corporate governance of the state-controlled public companies in China regarding the operation of Chinese domestic venture capital when compared to American venture capital. In China, the state will be one of the owners after the investment so it can control the operation of the company. The author concludes that the government should not impact the shareholders meeting.

The government's funds should be of sufficient scale. Gill (2015) in the UK and Wonglimpiyarat (2011) in Thailand accented that allocating sufficient resources can promote startups to become competitive. Wonglimpiyarat (2011) encourages the Thai government to support all types of startups.

Based on their survey in Portugal, Bilau et al. (2017) suggested that the government should focus on improving the efficiency of the investments. They add that the government should focus on educating the entrepreneurs rather than on organizing workshops and forums where financiers and young companies can meet. Cohen et al. (2012) found the Israeli high-tech industry's dependence on foreign investors (mainly US) problematic. According to them, the government should try to remove the obstacles between Israeli institutional investors and the high-tech sector. Tucker et al. (2011) stressed that funds should not sponsor labor costs.

4.6 Summary

The aim of this chapter was to give an overview on the governmental venture capital research field from 2000 to 2018 by looking at papers from Scimago ranked journals. The issue is very relevant since economic growth can be fostered by startup companies. Owing to some market failures, it is difficult for startups to acquire their initial funding. Governments around the world are motivated to solve these market failures at the venture capital market. Numerous governmental venture capital programs were announced to support young companies and academic researchers were keen on investigating the reason and the efficiency of the governmental intervention. Therefore, two major research streams were identified: articles investigating the reason for the

governmental intervention at the venture capital market and articles analyzing the effects of governmental venture capital intervention. The following table contains the results connected to the propositions.

Table 21: Result table for chapter 4

	Proposition	Supported	Partly supported	Not supported
P1a	The articles of the research field were published in the highest quality Scimago-ranked journals (Q1-Q2).	X		
P1b	The articles of the research field mainly employ econometrical analysis as research methodology.	X		
P1c	The interest in the research field between 2000 and 2018 was mainly caused by the governmental response to different economic crises.	X		
P1d	The articles mainly investigate the American governmental venture capital initiatives.			X
P2a	The articles mainly examine purely governmental venture capital and governmental-private partnership venture capital.		X	
P2b	The articles primarily associate negative effects with direct governmental intervention.			X
P2c	The articles associate positive and negative effects in equal measure with public-private venture capital partnerships.		X	
P2d	There is no intervention type that is only associated with positive effects.			X

Source: own editing

Between 2000-2018, 26 articles were published on this topic, only in Q1-Q2 journals. We categorized these articles along a number of dimensions. The investigated geographic areas of these articles cover the USA, Canada, several countries from Europe, Israel, China, Thailand, South Korea and Australia. The investigated time periods of these articles range mainly from the early '90s up to 2014. Gill (2015) investigated the government intervention at the UK venture capital market form 1945 which is an outlier in that sense.

The study also explored in more detail the positive and negative evidences that these articles presented on the different forms of governmental intervention at the early-stage venture financing market using qualitative content analysis. Categories and themes were assigned to the raw in vivo codes. The identified themes correspond to the

forms of involvement: purely governmental venture capital, governmental-private venture capital partnership, governmental supported pre-seed financing and recommendations. The presented evidences varied with respect to the geographical location, the employed research method and the form of intervention. Purely governmental venture capital was found to not crowd-out private venture capital in studies using European data, but the opposite was found when examining emerging markets. Purely governmental venture capital investments were found to be less efficient than private venture capital investments in several geographic locations. On the other hand, governmental venture capital-private venture capital partnership is praised by most articles for making better investments than purely governmental venture capital or private venture capital alone. The CEE governmental venture capital-private venture capital programs, however, were criticized for being too short, small in scale and bureaucratic. Governmental pre-seed support through technological incubators was found to support the venture capital industry and advance national objectives in Israel. Even though private technological incubators were found to provide better services, they can't substitute for public incubators as they support a far greater range of startups than do private ones. There is also evidence of successful governmental efforts to support business angel funding in Portugal.

Table 22: 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
Purely Government involvement	24	24
Sum	75	38

Source: own editing

Based on the articles, 11 categories of recommendations were identified. The most frequent suggestion was that the government should complement the private sector and not compete with it. This recommendation has a very significant consequence to further research since the state could not realize a fair return on their investment funds and it is principally wrong to compare its performance with the private sector.

Otherwise, when the realized return is lower than the private investors', governmental agents are blamed for handling state provided sources carelessly. But even if they perform better than the private investors, they can still be blamed for crowding out the private investors. Thus, the governments should provide startupers with the opportunity to do R&D and then transfer the company to be funded by private investors as early as possible. Consequently, the state efficiency should be measured by the number of those projects which were bought out by the private sector. Another important global suggestion is that the programs announced by the government should complement each other. As a summary, governments should intervene at the very risky pre-seed phase by funding projects and educate the entrepreneurs. Furthermore, governments should ensure a stable institutional background which can also lessen the need for governmental intervention.

5 The Hungarian venture capital market and the government³

In the previous chapter I described the market failures that traditionally justify the intervention of the government and showed how those failures are present at the venture capital market. A comprehensive qualitative systematic literature review was also presented to show the direction of the research surrounding governmental venture capital. This literature review also contained the various best practices that are used around the world when handling these governmental programs. Now that we are familiar with the international experiences of this type of governmental intervention, it is time to place the focus on the domestic venture capital market and the Hungarian governmental venture capital programs. After a brief introduction of the market failures behind the governmental venture capital intervention, this chapter will show the evolution of this market, the various governmental venture capital programs that took place and are in preparation and the main government owned venture capital fund management companies along with their managed funds. Ultimately, the goal of this chapter to show how the best practices of international governmental venture capital programs are reflected in the domestic programs.

5.1 Research questions

Since this chapter examines the Hungarian indirect and direct governmental intervention at the venture capital market, it is best to divide the research questions into two groups accordingly.

Table 23: Research questions for chapter 5

RQ1: What phases did the Hungarian venture capital market go through during its evolution?
RQ2: What characteristics did the Jeremie program have in terms of the provided capital, the number of winner fund management companies and its duration?
RQ3: How can we evaluate the results of the Jeremie program?
RQ4: How did the execution of the Jeremie program reflect the international best practices of governmental venture capital programs?
RQ5: In what form does the Hungarian government intervene directly at the venture capital market?
RQ6: What are the strategic goals of this direct intervention?
RQ7: How did the COVID-19 pandemic change the governmental direct intervention?

³ This chapter contains some of the results of my research with Erika Jáki and György Walter, the resulting study from that research was published in Management, Slovenia (Jáki et al., 2017) and the ECMS conference proceedings (Jáki and Molnár, 2017)

Source: own editing

RQ1 aims to explore the history of the Hungarian venture capital market to get a foundation for the further analysis. The following three research questions (RQ2-RQ4) all investigate the indirect governmental venture capital intervention in Hungary, which so far mainly took the form of the Jeremie program. First, I will show the characteristics of the Jeremie program in terms of size of funds, number of winners and duration (RQ2), then show how researchers evaluated the program (RQ3). Contrasting this with the best practices that were presented in the previous chapter is the goal of RQ4. The last three research questions (RQ5-RQ7) deal with the direct domestic governmental intervention by investigating the government owned venture capital fund management companies and their managed funds (RQ5), the strategic goals of these funds (RQ6) and the governmental response to the COVID-19 pandemic using direct intervention (RQ7).

Table 24: Propositions for chapter 5

Proposition 1a: The government initially entered the venture capital market to fill the financing gap in the early stage financing segment where private venture capitalists were inactive
Proposition 1b: The Jeremie program increased the venture capital investment activity during its course in Hungary.
Proposition 1c: The Jeremie program succeeded in its goal of regional development.
Proposition 1d: The Jeremie program succeeded in financing the early-stage companies that needed the investment the most.
Proposition 1e: The Jeremie program had positive effects on the target companies.
Proposition 1f: The selection of the winning fund management companies of the Jeremie program was a transparent process.
Proposition 1g: The execution of the Jeremie program followed international best practices.
Proposition 2a: The domestic government intervened directly at the venture capital market during the course of the Jeremie program.
Proposition 2b: The domestic government shifted its focus from indirect intervention to direct intervention following the Jeremie program.
Proposition 2c: The strategic goals of the domestic direct governmental intervention include the financing of enterprises providing positive externalities.
Proposition 2d: The government employed direct venture capital intervention in its response to the COVID-19 pandemic.

Source: own editing

5.2 Methodology

The employed methodology in this chapter can be divided into three parts:

- First, we collected studies presenting the early development of the market, which we supplemented with data from Invest Europe and drew conclusions from those.
- The second part presents the indirect state intervention, especially the Jeremie program, as the most important indirect state venture capital intervention in Hungary. The analysis was performed by collecting the publicly available data attached to the program such as official announcements and later publications by research institutes and researchers. 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 at the domestic government based on publicly available data from the websites of the Hungarian governmental fund management companies. These data include the size of managed funds, investment policy of managed funds and if available even the size of investments that were carried out.

5.3 The evolution of the domestic venture capital market

We face a problem when trying to show the evolution of the Hungarian venture capital market from its earliest stages (RQ1). This is because there is a shortage of data sources and studies in the early time period, the 90's. The main data source in this market is the Hungarian Venture Capital Association (HVCA) which was founded in 1991, and all Hungarian private equity and venture capital fund management companies are required to be its members and participate in data collection.

HVCA published the earliest survey-based representation of the domestic venture capital and private equity market in 2005 (Karsai and Baranyai, 2005) which showed the development of the market between 1989 and 2005. The survey collected data on the Hungarian fund management companies (capital available for investments, sum of investments, exits) and their transactions during the time period under investigation. The data collected from the investors was supplemented with data available in the press. The authors found that during this first 15 years the market focused on expansion-stage investments (64% of transactions and 80% of investment volume took place in this segment), while the early-stage investments were a minor part of the market (32% of transactions and 10% of investment volume). The authors categorize the evolution of

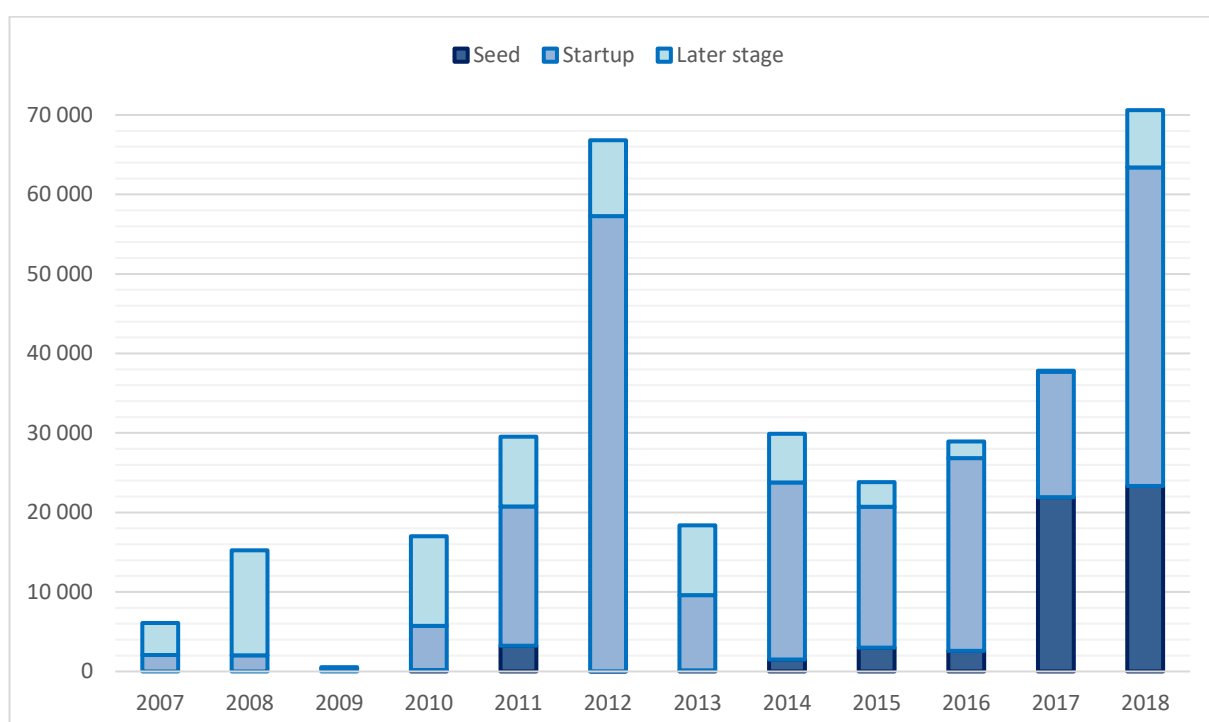
the market into four phases. The first two phases included only private equity investment activity, and traditional venture capital investments appeared only in the third phase. The next period, 2005-2010, was presented by a further survey of the HVCA from which we can learn about the further development of the market (Karsai, 2011A; Karsai, 2011B).

- The first phase (1989-1992) was characterized by two major types of funds: global funds, which invested foreign government funds, and the so-called “country funds”, which typically only invest in one country. The average size of these funds was around 50 million dollars, which is small for international investment funds, because they didn’t have enough confidence in the Hungarian market yet. Privatization played a central role in these investments.
- In the second phase (1993-1997) regional funds focusing on the CEE region entered the market, additional country funds appeared and some sector funds too, which focus on a particular industry sector. The size of these funds reached the volume of 100 to 200 million dollars. This is when the focus shifted to the financing of the expansion of the domestic companies.
- The third phase (1998-2000) was dominated by regional funds, and the focus of investments was mainly on financing technology companies. The size of the funds grew again, this time to 250-300 million dollars. This phase saw the birth of the classical venture capital investment segment within the private equity sector. The members of the venture capital market started investing in technology, information technology and media companies.
- In the fourth phase (2001-2005) the streamlining of the market took place, meaning that only the most successful fund management companies could stay in the market. Specialized investors and buy-out financing appeared. The presence of governmental investors increased SME financing. With the entry of Hungary into the European Union, new global investors started their activity in high-value buy-outs and structured transactions.
- The majority of the fifth phase (2005-2010) was characterized by great international interest in the evolving Hungarian market, the number of global funds operating at the market increased (peaking in 2008). This advantageous period was however cut short by the financial crisis of 2008, and the invested capital by private equity and venture capital funds plummeted. Due to this, in

2009-2010 the country funds became the largest investors at the market with the withdrawal of global funds.

For the traditional venture capital segment, the setback caused by the crisis can be seen clearly on Figure 15, which shows the venture capital investment volume in Hungary between 2007 and 2018 in thousand EUR across different life cycle stages using data from Invest Europe.

Figure 15: Venture capital investment volume in Hungary between 2007 and 2018 in thousand EUR across different life cycle stages



(Source: Invest Europe, 2017; Invest Europe, 2019)

- From 2007 to 2016, governmental venture capitalist activity intensified in the market in the form of indirect intervention (Jeremie program) and direct intervention (Széchenyi Capital Fund Management – SZTA); the two initiatives accounted for three-quarters of all venture capital investments in the country between 2007 and 2016 (Karsai, 2017b). Since 2017, the volume of SZTA's investments has decreased and Hiventures has become the leading role in the distribution of public venture capital funding (SZTA; 2020, Invest Europe; 2017, Invest Europe; 2020).

The private venture capitalists preferred later stage investments compared to the early-stage investments. This can be explained by the fact that it is not economical for private venture capital investors to invest below a certain investment volume due to the fix costs of the investment process and they also don't tolerate the very high risk associated with these investments. This investment behavior can not only be observed in the later 2000's as seen on Figure 15, but also in the earlier time periods. Karsai (2011) shows that between 1989 and 2010 only 4% of venture capital investment volume went to early-stage companies. The Hungarian government entered the venture capital market directly investing into early-stage companies as early as 2002, providing 17,5% of total venture capital investment volume between 1989 and 2010, thus *proposition 1a* – “*The government initially entered the venture capital market to fill the financing gap in the early stage financing segment where private venture capitalists were inactive*” – *finds support*. However, after seeing the devastating effects of the 2008 crisis, it was clear that larger governmental intervention was needed to revitalize the market. Thanks to the governmental intervention which was made in the framework of an EU venture capital program, the venture capital market recovered quickly, topping the investment volume of 2008 by as early as 2010 (see Figure 15).

5.4 Indirect governmental intervention – the JEREMIE program

In the 2007-2013 planning period, indirect state intervention became typical in the Hungarian market. The European Union has provided funds to private sector fund managers through the state through the so-called 'Jeremie program'.

5.4.1 The history and continuation of the Jeremie program in Hungary

In 2009 the Jeremie I. program was launched in Hungary by the state. Sources were distributed among the funds in more stages through a tender system. The Jeremie (Joint European Resources for Micro to medium Enterprises) program was founded by the European Committee together with the European Investment Fund. The program supported micro-, small- and medium-sized enterprises. This capital infusion gave a new impulse to the Hungarian venture capital investments. The program can be examined in more detail regarding its fund sizes, winning fund management companies and duration (RQ2).

The New Hungary Venture Capital Program (also called as Jeremie I) distributed funds between 8 winning venture capital funds and their management companies. Since

these management companies were owned by the private sector, this type of governmental intervention is indirect, since government provided funds are managed by private fund management companies. The total volume of these funds was about 48 bn HUF with at least 30% private sector investment and with a maximum of 70% state involvement in each fund. The size of the smallest and the largest fund was 4 bn HUF and 7,36 bn HUF respectively (MV Zrt., 2013). T

The Hungarian state provided 27 billion HUF equity to local venture capital investors in 2012. Main sources came from the European Regional Development Fund in the framework of the New Széchenyi Venture Capital Program - Economy Development Operative Program 4. This program was also called Jeremie II. program. In the program 6 billion HUF could be invested via the so-called Common Seed Fund subprogram to finance micro- or SMEs established within 3 years with a maximum annual sales revenue of 200 million HUF. The funds could invest the remaining 22,5 billion HUF through the Common Growth Fund subprogram to micro companies, SMEs and to medium-sized companies established within 5 years with a maximum sales revenue of 5 billion HUF (Palyazat.gov.hu, 2012). The total size of all the funds was 41 bn HUF, the size of the smallest fund was 2.14 bn HUF, and the largest fund received 6.5 bn HUF (MV Zrt. 2013).

Seven out of the eight funds were common funds, meaning that the private investor had to commit its funds (30%) at the start, while one fund was a co-investment fund. In the co-investment fund scheme the state provided all the funds at the start but had to look for a private partner investor every time the fund wanted to make an investment. This meant that that the investment policy could be more agile since the fund could seek out the private investors who are the best fit for different types of investments (Századvég, 2016).

Table 25: JEREMIE I-II Winners

New Hungary Venture Capital Program		
Fund management company	Managed fund	Size of fund (mn HUF)
Biggeorge's-NV EQUITY Kockázati Tőkealap-kezelő Zrt.	Biggeorge's-NV EQUITY I. Kockázati Tőkealap	4 000
Central-Fund Kockázati Tőkealap-kezelő Zrt.	CenTech Új Magyarország Kockázati Tőkealap	5 000
DBH Investment Zrt.	DBH Investment Kockázati Tőkealap	5 000

Euroventures Kockázati Tőkealap-kezelő Zrt.	Euroventures IV Kockázati Tőkealap (Co-investment Fund)	7 097
Finext Startup Kockázati Tőkealap-kezelő Zrt.	Finext Startup Kockázati Tőkealap	7 360
MORANDO Kockázati Tőkealap-kezelő Zrt.	Morando Kockázati Tőkealap	6 506
Portfolion Kockázati Tőkealap-kezelő Zrt.	OTP Kockázati Tőkealap I.	6 800
Primus Capital Kockázati Tőkealap-kezelő Zrt.	Primus III. Kockázati Tőkealap	6 200
New Széchenyi Venture Capital Program (Common Seed Fund – Common Growth Fund)		
Fund management company	Managed fund	Size of fund (mn HUF)
Bonitás Kockázati Tőkealap-kezelő Zrt.	<u>Bonitás Kockázati Tőkealap</u>	6 500
Első Magyar Kockázati Tőkealap-kezelő Zrt.	<i>Conor Seed Capital Kockázati Tőkealap</i>	2 150
Core Venture Kockázati Tőkealap-kezelő Zrt.	<i>Core Venture Közös Magvető Kockázati Tőkealap</i>	2 145
Kairos Kockázati Tőkealap-kezelő Zrt.	<i>Kairos Magvető Kockázati Tőkealap</i>	2 143
	<u>Kairos Novekedési Kockázati Tőkealap</u>	6 429
New York Kockázati Tőkealap-kezelő Zrt.	<u>New York Kockázati Tőkealap</u>	4 300
Prosperitás Kockázati Tőkealap-kezelő Zrt.	<u>Prosperitás Profit Közös Növekedési Kockázati Tőkealap</u>	6 430
	<i>Prosperitás Proseed Közös Magvető Kockázati Tőkealap</i>	2 150
Venturio Kockázati Tőkealap-kezelő Zrt.	<u>Venturio 2013. Kockázati Tőkealap</u>	4 412
X-Tech Capital Kockázati Tőkealap-kezelő Zrt.	<u>X-Tech I. Kockázati Tőkealap</u>	4 288

Source: (MV Zrt., 2013)

The table above shows the winning fund management companies, their managed funds and the size of the funds of the New Hungary Venture Capital Program (also known as Jeremie I.) and New Széchenyi Venture Capital Program (also known as Jeremie II.). The size of the funds includes both the resources provided by the state and the private investors.

The subprogram of the Széchenyi Capital Program Common Growth Fund expanded further in several steps. In the stage named as Jeremie III, eight venture capital fund managements received 3 billion HUF each in 2013 (Ministry of Innovation and Technology, 2013). The winners were the following:

1. Alliance Jura-Hongrie Kockázati Tőkealap-kezelő Zrt.
2. Perion Invest Kockázati Tőkealap-kezelő Zrt.
3. Tőkepartner Kockázati Tőkealap-kezelő Zrt.
4. Dinamo Ventures Kockázati Tőkealap-kezelő Zrt.
5. Hemisphere Kockázati Tőkealap-kezelő Zrt.
6. PBG FMC Kockázati Tőkealap-kezelő Zrt.
7. Valor Capital Kockázati Tőkealap-kezelő Zrt.
8. Core Venture Kockázati Tőkealap-kezelő Zrt.

In the stage named as Jeremie IV. (GOP-2013-4.3/B/2) in 2013, only two fund management companies were provided with 3 bn HUF each: Gran Private Equity Zrt. and Garangold Investment Befektető Zrt. Finally, in the last stage (GOP-2014-4.3/B or sometimes referred to Jeremie V) in 2014 2,7 bn HUF was awarded to Valor Capital Kockázati Tőkealap-kezelő Zrt. (Equinox Consulting, 2016).

There were other forms of governmental indirect intervention at the Hungarian venture capital market outside the Jeremie program. The Export-Import Bank Plc. launched two funds from state resources in 2015 and awarded the right to manage those funds – totaling 16 bn HUF – to GB & Partners Venture Capital Fund Management Plc. The fund management company published data on its investments in 2017, which showed that they made two investments with a value of 934 million HUF and 1,5 bn HUF (Karsai, 2017b).

This was followed by several further rounds of governmental venture capital programs, funded by EU and state resources that awarded the right to manage these funds to private fund management companies through tender processes. In 2018 the GINOP-8.1.3/B-17 program distributed 75 bn HUF among seven winning fund management companies. The aim of the program was to fund companies in the peripheric regions of Hungary that can produce innovations in the area of sustainably and smart city development, healthy society, information and communication technology, agriculture, intelligent technologies, mechanical industry, sustainable environment and renewable technologies. The winning private sector funds were the following:

1. FINATECH Capital Kockázati Tőkealap-kezelő Zrt.
2. X-Ventures Alpha Kockázati Tőkealap-kezelő Zrt.
3. Bonitás Befektetési Alapkezelő Zrt.
4. CV Alapkezelő Zrt.
5. Primus Capital Kockázati Tőkealap-kezelő Zrt. (Solus Capital)
6. DBH Investment Kockázati Tőkealap-kezelő Zrt.
7. X-Ventures Béta Kockázati Tőkealap-kezelő Zrt.

At the same time, the VEKOP-2.1.2-17⁴ program provided 5,13 bn HUF EU funds to one private sector fund management company – Gran Private Equity – to invest in firms that innovate in the same sectors as those supported by GINOP-8.1.3/B-17, but the firms can operate in Central-Hungary as well (Prim Online, 2018).

5.4.2 Evaluation of the Jeremie program in Hungary

To assess the effects of the Jeremie program on the Hungarian venture capital market (RQ3), multiple approaches can be taken. On one hand, we can look at the general venture capital investment activity and the share of Jeremie funds in the investments over the course of the program (2009-2016) to see how it affected the supply of venture capital. Publicly available data sources for investment activity include Invest Europe, and HVCA (the latter only started publishing statistical data reports from 2014).

The previously presented Figure 15 shows that as a result of the financial crisis in 2008 there was very weak seed and start-up venture capital activity on the Hungarian market. With the start of the Jeremie program, the venture capital market began to speed up, reaching the peak point of its investment activity in 2012. After a decline in 2013, venture capital activity remained stable during 2014-2016. Interestingly, seed investment activity remained on a low level, development was much more apparent on start-up market.

Examining the last three years of the program in Hungary, around 100 investments were made annually between 2014-2016, see Table 29. The Jeremie funds' share of these investments increased year by year from 50% to 84%.

Table 26. Total Number of Investments and the Share of Jeremie Funds

Year	2014	2015	2016
Total number	96	109	94
Jeremie share	50%	61%	84%

Source: HVCA (2014, 2015, 2016)

From this, we can conclude that the Jeremie program contributed significantly to the venture capital investment activity in Hungary, thus *Proposition 1b* – “*The Jeremie*

⁴ The GINOP-8.1.3/B-17 and VEKOP-2.1.2-17 programs were considered a continuation of the original Jeremie program and thus were called “New Jeremie” or “Jeremie 2.0” by the researchers (Karsai, 2020)

program increased the venture capital investment activity during its course in Hungary” – is supported. However, this is not the only metric by which the program can be judged. We must also look at whether the program achieved its goals.

One aim of this program was regional development, the majority of participating fund managers were supposed to invest in the peripheric regions of Hungary. Lovas and Illés (2018) analyzed data collected on the target companies who received investments in the program. They found that the funds invested in companies who are headquartered in a peripheric region, but who’s actual operation takes place in the capital city. This subverts the original aim of strengthening the peripheric regions and thus *Proposition 1c – “The Jeremie program succeeded in its goal of regional development” – is unsupported.* Additionally, the funds notoriously invested in companies with already high sales activity to instantly satisfy the exit requirement of a certain sales volume. This led to companies that most needed funding (seed companies) receiving less investments than intended, thus *Proposition 1d – “The Jeremie program succeeded in financing the early-stage companies that needed the investment the most” – does not find support either.* Finally, nearly all of the fund managers acquired majority shares in the target companies, which can reduce the long-term motivation of founding members (Lovas & Illés, 2018). When analyzing data of firms who received investments from JEREMIE funds, Fazekas and Becsky-Nagy (2019) found that there was a negative relationship between firm growth and the equity share of the venture capitalist in the firm due to agency costs, which also confirms that acquiring majority shares in target companies reduces the motivation of the founders. If the investments were provided in stages that are connected to milestones that the target company must achieve, than this would motivate the target companies to perform during the investment period while also limiting the equity share of the investor (Századvég, 2016).

Fazekas (2018) found that companies receiving funding directly from a governmental venture capital fund (managed by a governmental fund management company) performed better than those which received funding from a JEREMIE fund (managed by a private sector fund management company) in terms of sales and employment growth, which indicates that the private investor’s motivation doesn’t lead necessarily to better company performance. This can be partly explained by the fund management fee being tied to the size of the funds and not the performance of the funds. In future programs the fund management fee being tied to the performance can be an additional motivator (Századvég, 2016). Kállay and Jáki (2019) also found that the

performance of target companies did not increase after receiving Jeremie funding. With regard to these evidences, the effects of the Jeremie program on target companies appear to be mixed, they certainly increased their available capital but the agency problems and the majority share acquired by the investors certainly undermined the efficiency of these investments in terms of sales employment growth, thus *Proposition 1e – The Jeremie program had positive effects on the target companies” – is partly supported.*

The selection process was also impaired by the size of the Jeremie program. Fazekas and Becsky-Nagy (2018) conclude that the supply of venture capital sparked by the program far outweighed the justifiable demand for such investments, which lead to difficulties for the fund management companies selecting the right applicants. They add that it is important to distinguish between target companies that want venture capital investment and target companies that can efficiently use venture capital investment. They suggest that by downsizing any future governmental venture capital programs, this issue could be solved, and there would be a higher chance that only companies that can efficiently use the investment will be selected by the fund managers. In another article they conclude that generally the moral hazard may lead to worse results of hybrid governmental-private venture capital investments compared to purely governmental venture capital (Fazekas and Becsky-Nagy, 2020).

Further moral hazard issues were identified, such as conflicts of interest between owners and managers of the fund and owners and managers of the target companies. In some instances, the target companies had to pay for services provided by companies that are owned by the funds' owners. The pipeline of applicants came from the personal acquaintances of the fund's owners, and the return potential of the applicant was not backed up by the submitted business plan. Additionally, there was a significant lack of oversight and monitoring of the whole program. There are some other difficulties are present connected to the regulations of the program. The size of the investment was often the function of the conditions of the fund and not the needs of the target company. The funds could not buy out a founder that became inactive or whose interests shifted during the investment period due to the EU regulation. The business plans of target companies did not fit the investment size, but they were still accepted. There were instances when the target company outsourced its operation and in effect did not operate the project for which the investment was given (Deloitte Zrt., 2016).

Despite questions concerning efficiency, we can state that the Hungarian government plays a significant role on the venture capital market and counts as a very active participant. There is no doubt about that it largely influences the market.

5.4.3 Comparison of the Jeremie program with international experiences

Drawing on the previous chapter, in which the literature about the different types of governmental interventions at the venture capital was explored and best practices highlighted, I will compare the execution of the Jeremie program with the best practices of governmental programs to provide a guideline to policymakers for the future programs (RQ4).

1. The first best practice is connected to the way **the state represents itself in the private fund management companies**. The Jeremie program was an indirect governmental intervention and a type of governmental-private venture capital partnership, in which the state provided the majority of the capital and provided guidelines for the investments but did not place any of its agents in the private fund management companies who were managing the funds. As highlighted in the previous sub-chapter, there were concerns about the selection process of these private investors by researchers, including moral hazard and playing around the guidelines of the investment selection. It is important to recall the study by Brander et al. (2015), who using a worldwide dataset and found that the presence of governmental investors in these partnerships can enhance the selection of prospective portfolio companies compared to a purely private venture capital investment. For the state placing some members into the decision-making committees or boards of the fund management companies of future venture capital programs would also serve as a monitoring tool to keep the investment selection process in check and in compliance with the investment guidelines. As Grilli and Murtinu (2014) pointed out, the private partner must still be in the leading role for the partnership to produce positive effects on portfolio companies. However, the monitoring presence of the state could, for example, prevent target companies receiving investment who only have headquarters in the region where the investments are destined to go but who in effect operate in the capital. Frenkel et al., (2008) also emphasized that governmental intervention should be mainly limited to the peripheric regions.

2. The second main suggestions that took shape from analyzing the literature was that **the government should complement the private sector and not compete with it** (Gill, 2015; Wonglimpiyarat, 2011; Bauer and Burghof, 2007). The Jeremie program, theoretically complied with this suggestion, since the state intervened in an indirect way, trying to promote private investors to act. The actual execution of the program, however, left many private venture capitalists dissatisfied. A survey by Karsai (2016) showed that the majority of private venture capitalists asked in the survey criticized the transparency of the selection process for fund management companies and felt that the winning fund management companies lacked the expertise required, thus *Proposition 1f – “The selection of the winning fund management companies of the Jeremie program was a transparent process” – is not supported*. In this way, the state inadvertently may have created more competition for the private venture capitalists who were not among the winners but who possessed the skills for successful target company selection. It is very important to consult with the private sector before launching the next venture capital program, and to improve the transparency of the fund management company selection process of the program. Fazekas and Becsky-Nagy (2018) pointed out that since there was not as much justifiable demand for venture capital as supply, the downsizing of future programs can lead to better investments. Additionally, the downsizing would also limit the artificially generated competition that private venture capitalists outside the program have to face.
3. The third main suggestion is that **governmental programs should not compete with each other** (Cumming and Johan, 2009; Tucker et al., 2011; Wonglimpiyarat, 2011). During the run of Jeremie there were several governmental venture capital fund management firms (see the next subchapter) managing multiple funds with state investment only. It is clear that the direct intervention (governmental fund management companies) and indirect intervention (Jeremie program) ran parallel to each other. As discussed previously, one aim of the Jeremie program was regional development, to which end Jeremie funds should have invested in firms headquartered outside the capital. With the governmental fund management companies not receiving such a limitation on investment policy, this could have eased the competition between the Jeremie program and the governmental venture capital companies. However, since even the target companies of the Jeremie

program in effect mostly operated in the tech hub of the capital, in reality there was competition between these governmental initiatives.

4. Finally, Karsai (2017a) analyzed the governmental programs of the CEE region and formulated a set of suggestions that the governments of these countries should follow when structuring their future venture capital programs. Namely: the duration of the program should be short in order to influence the market as little as possible, the bureaucratic requirements should be minimized, the programs should not be over-engineered, and data should be collected during the course of the program in order to carry out a complete evaluation at the end. The Jeremie program failed to comply with these suggestions. Looking at all the evidence, *Proposition 1g – “The execution of the Jeremie program followed international best practices” – is unsupported.*

5.5 Direct governmental intervention

In this sub-chapter I examine the direct interventions at the venture capital market by the Hungarian government (RQ5). Direct intervention means that the state owns the fund manager company that manages state-provided financial resources (funds). According to HVCA, 26 fund management companies operate in 2020 on the Hungarian venture capital market and three of them are owned by the state: Széchenyi Venture Capital Fund Management Plc. (SZTA), Hiventures Capital Fund Management Plc. (formerly: Corvinus Venture Capital Fund Management Plc. - CVCFM), and MFB Invest Investment and Asset Management Plc (MFB Invest). MFB Invest Plc. is not an equity fund management company, however, it has investments in several funds and is a 100% owner of two private equity fund management companies.

I will also look at the investment policies of the different managed funds in order to highlight what national strategic objectives they serve (RQ6). The chapter ends with the exploration of the governmental response to the COVID-19 pandemic through its direct intervention methods (RQ7).

5.5.1 The funds and fund management companies of MFB Invest

Through MFB Invest, the Hungarian Development Bank has invested in several funds managed by different fund managers. Therefore, MFB Invest Investment and Asset Management Plc has made investments in funds, and 100% owner of fund management companies, but legally it cannot be considered (despite being registered with the HVCA). The governmental intervention manifests through the activity of

Focus Ventures Venture Capital Fund Management Plc. and Hiventures Venture Capital Management Plc. (both a 100% subsidiary of MFB Invest – MFB Invest, 2020a) can be classified as direct state intervention, as they are management companies that manage only state resources. However, it is also worth seeing that some funds in which MFB Invest has invested are managed by private management companies, so there is also indirect intervention. The table below shows the funds in which MFB Invest has made an investment.

Table 27: MFB Invest Investment and Asset Management Plc

Name of the fund	Fund's size	Investment targets	Owners	Manager of the fund
Enter Tomorrow Venture Capital Fund	50 mn EUR	more mature companies with high growth potential	MFB Invest and MOL Plc.	LEAD Ventures Fund Management Plc.
IMPACT Ventures Private equity funds (I-II.)	6,25 bn HUF	companies with a positive social impact	MFB Invest, European Investment Fund, Optima Investment Plc., Impact Ventures Team Ltd.	IMPACT Ventures Venture Capital Fund Management Plc.
Divat&Design Capital Fund	5 bn HUF	innovative companies with high growth potential in the fashion and design sector	MFB Invest	Hiventures Venture Capital Fund Management Plc.
Chi Fu Hungarian Economy Opportunity Fund	200 mn EUR	companies requiring larger private capital investments	MFB Invest and Chi Fu Investment Group	Chi Fu Investment Management Plc.
Water Impact Fund	5 bn HUF	innovative enterprises in the field of water solutions	MFB Invest	Susterra Capital Partners Venture Capital Fund Management Plc.
Debreceni Industry Development Fund	15 bn HUF	development of industrial parks in Debrecen	MFB Invest and XID Investment Plc.	XANGA Ventures Private Equity Fund Management Plc.
City Funds	2-10 bn HUF / fund	mature and innovative enterprises of certain Hungarian cities	MFB Invest	Focus Ventures Venture Capital Fund Management Plc.

Source: own editing based on data from MFB Invest (2021)

Besides generating profit, the aim of Focus Ventures is regional development which it achieves through managing so-called “city funds”, funds that are created to perform investment exclusively in a dedicated city. So far three funds have been created for the cities Debrecen, Székesfehérvár, and Kaposvár (MFB Invest, 2020b). This is an example of the state intervening at the venture capital market for the sake of the positive externality produced by the investment, in this case regional development. Another aim

of these funds is to help alleviate the negative economic effects of the SARS-CoV-2 (or coronavirus) pandemic. The size of the funds is 10 bn HUF for the Debrecen city fund (MFB Invest, 2020c), 5 bn HUF for the Székesfehérvár city fund (MFB Invest, 2020d), and 3 bn HUF for the Kaposvár city fund (MFB Invest, 2020e). MFB Invest also invested into the Water Impact fund in 2019, which is managed by Susterra Capital Partners Venture Capital Fund Management Plc. (indirect intervention) which will make investments into Hungarian, CEE and DACH firms that develop innovative solutions to improve water usage efficiency and contribute to the solution for the world's water supply issues (MFB Invest, 2019). This is another example of the state contributing funding to companies with social impact, another form of positive externality. The presence of these funds that carry out investments supporting the national strategic objective of regional development, employment growth, sustainability and social impact as positive externalities *support Proposition 2c – “The strategic goals of the domestic direct governmental intervention include the financing of enterprises providing positive externalities”*.

5.5.2 Hiventures Venture Capital Fund Management (formerly CVCFM)

CVCFM originally was founded in 1999 as Corvinus Fund Management Company, then was renamed Hiventures and was appointed to manage substantial governmental funds. In the framework of the 2014-2020 programming period the fund management company was funded with 50 bn HUF to invest in pre-seed, seed and expansion-stage companies. The size of these branches was 10 bn for pre-seed, 16 bn for seed and 24 bn for expansion.

The initial aim of Hiventures was to finance companies that the private sector venture capital investors would find too risky to finance, and to improve the startup ecosystem. Its funding was later increased to 80,4 bn HUF as Hiventures was selected to manage multiple governmental venture capital programs: GINOP-8.1.3/A-16, GINOP-8.2.3-17, and GINOP-8.2.5-17. With this large size, it is apparent that the state continued its previous indirect venture capital intervention (Jeremie program) with the direct route by appointing Hiventures to manage the state funds, thus *Proposition 2b – “The domestic government shifted its focus from indirect intervention to direct intervention following the Jeremie program” – is supported*. The size of their pre-seed investment was 9 million HUF in the beginning, 65-250 million HUF for seed investments, and 250-1000 million HUF for expansion investments. From its

restructuring and launch in 2016 August up to the end of 2018 Hiventures screened more than 2000 investment proposals, invested in 204 companies with a total investment volume of 17 bn HUF. 122 pre-seed-stage companies received a total of 2,4 bn HUF investment, 48 seed-stage companies a total of 5,3 bn HUF investment and 34 expansion-stage companies a total of 9,5 bn HUF investment (Hiventures, 2019). The fund management company can't invest in companies that would produce negative externalities, such as casinos, weapon manufacturing firms, companies involved in pornography or prostitution (Palyazat.gov.hu, 2017). This also confirms that governmental venture capital investors invest in companies that produce positive externalities and they are prohibited to invest in negative externality producing firms.

The company predominantly invests state funds but managed to involve a private sector co-investor in 18 investments, drawing 2,2 bn HUF of private investment. The fund management company states that its portfolio companies realized an 85% average increase in sales as a direct consequence of the investment (Hiventures, 2018). Similarly to SZTA, Hiventures can only obtain a minority share in target companies during the first round of investment; a target company can, however, receive multiple rounds of financing from Hiventures as it matures and develops, during which the equity share can exceed 50% but not exceed 80%. If the company becomes exceptionally profitable, it can also buy back the fund's share, but other exit possibilities are also open, including joint sale to a third-party investor or IPO (Palyazat.gov.hu, 2017). Thus, the investment structure of the state venture capital investors fundamentally differs from those of the private venture capital investor companies (see next sub-chapter).

Hiventures also launched an investment branch in 2019 called SMEPRO (KKVPRO), which manages a 31 bn HUF fund aimed at supporting more established, matured SMEs with a minimum of 300 million HUF revenue seeking funding. The reason behind these investments can be to support the transition of family-owned businesses' ownership to the management or a domestic third-party investor, to provide financing for mergers and acquisitions of SMEs, and to support international expansion of SMEs. The size of these investments is between 50 million HUF and 3,1 bn HUF and the fund retains a minority ownership in the target company. The international expansion goals include the acquisition of foreign companies which increases the incoming revenue to the country – a national strategy objective (Hiventures, 2019).

In conclusion, governmental venture capital investments dominated the market between 2007 and 2016 in the form of indirect intervention – the Jeremie program, and

direct intervention – Széchenyi Fund Management Company, the two initiatives providing three quarters of all venture capital investments made in the country during the period 2007-2016 (Karsai, 2017b). Since 2017, the proportion of SZTA investments' volume decreased (see Table 31), and Hiventures took the leading role in distributing governmental venture capital funding.

5.5.3 Széchenyi Venture Capital Fund Management

SZTA was launched on the 1st of June 2011. It must be noted that despite being a venture capital fund manager company, SZTA also makes later stage investments. The funding of SZTA is 85% provided by the EU and 15% by the state, similarly to the Jeremie program (Fazekas and Becsky-Nagy, 2018).

Since its inception, SZTA made 120 investments and performed more than 40 exits. SZTA manages the following funds.

Table 28: Széchenyi Venture Capital Fund Management Plc.

Name of the fund	Size of the fund	Investment targets
Széchenyi Equity Investment Fund	22 bn HUF	innovative domestic SMEs
Irinyi I. Equity Investment Fund	7,47 bn HUF	industrial innovation SMEs in domestic peripheric regions
Irinyi II. Equity Investment Fund	8 bn HUF	industrial innovation SMEs in central Hungary
Kárpát Basin Enterprise Development Venture Capital Fund	20 bn HUF	micro, small and medium enterprises with international expansion potential
National Stock Exchange Development Fund	13 bn HUF	SMEs intending to enter the stock exchange with an IPO
Blue Planet Climate Protection Venture Capital Fund	10 bn HUF	SMEs innovating in sustainability, clean energy, sustainable water solutions, climate protection

Source: own editing based on data from SZTA (2020)

SZTA manages funds that seek to achieve a variety of strategical goals: supporting innovation, periphery development, supporting industrial innovation, supporting SMEs with entering international markets, helping more established SMEs enter the stock exchange and even supporting sustainability. The Blue Planet Climate Protection Venture Capital Fund is another example of a government venture capital initiative which aims to fund SMEs that contribute positive externalities including innovation in sustainability, climate protection clean energy and sustainable water solutions. SZTA involves co-investors when investing from the Irinyi funds (GINOP-

8.3.3-17 venture capital program) and the National Stock Exchange Development Fund, which shifts its characteristics toward a hybrid financing model. Standaert and Manigart (2018) found that companies receiving investment in the form of a joint public-private investment had greater employment growth than companies who only received state or only private investments. The previous chapter pointed out other studies which captured positive effects of hybrid public-private financing. Based on these, SZTA is moving in a good direction and expanding its co-investment scheme could be the solution to the problems of government venture capital investments.

Table 29: 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
<i>Proportion of SZTA venture capital investments compared to total venture capital investments in Hungary</i>	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)

According to the above table, the government owned SZTA fund management company made a very significant portion of all venture capital investments in Hungary during its lifetime so far. It has provided half of the total invested capital in 2014 and 2015, however its share diminished in the recent years. During the major indirect venture capital program Jeremie, the government still had such a significant direct presence on the Hungarian venture capital market, thus *Proposition 2a* – “*The domestic government intervened directly at the venture capital market during the course of the Jeremie program*” – is supported. According to Századvég (2016), at the start of the fund management company, it only managed the Széchenyi Equity Investment Fund, with the intent of not competing with the Jeremie program by offering smaller sized investments to a maximum of 750 thousand EUR. Since governmental intervention is most justifiable in the pre-seed and seed financing segment, the presence of SZTA was

better positioned to combat the equity financing gap than the Jeremie program. Additionally, SZTA can only obtain a minority share in target companies, which also motivates the founders more to increase the value of their firm (see the previous sub-chapter for criticism about the oppressive majority shares that Jeremie funds acquired in target companies).

5.5.4 Difference between governmental and private venture capitalist attributes

Venture capital fund management companies invest into equity. In the investment contracts, they define exit opportunities, the practice of ownership rights, voting rights, the decisional scopes of stakeholders, and the right to delegate members into different positions and boards (supervisory board members, board of directors, the CEO, etc.) To identify the differences let us examine the characteristics of the private venture investment deals first.

The private venture fund management companies concentrate on getting as big an ownership stake as possible in the target company. If the target company becomes more valuable, then investors can realize substantial returns by the exit. The private investors focus on getting a majority share in the target companies to get control rights. They like to emphasize that they are strategic investors and partners with a business network and market know-how. They also usually insist on including in the contract the so-called drag-along right, which obligates the founders to sell their shares together if the venture capitalist can set up an exit.

As opposed to that, governmental venture capital investors are typically financial investors: they do not wish to intervene in the everyday operation. They do not necessarily acquire a majority share in the target companies, their share usually remains under 49%. Thus, they leave the leadership in the hands of the original founders (at least in the first investment round). In several investment rounds, however, their holdings may exceed the 50% threshold (and may even reach 80%). If the state share exceeds 50%, the target company loses its SME status under EU regulations, but this does not prevent the investment, only the target company must be informed about it (Palyazat.gov.hu, 2016). As the investor's shareholding increases, the entrepreneur's motivation decreases (Lovas & Illés, 2018; Becsky-Nagy, 2019), so it is recommended to stipulate in future state venture capital programs that the state shareholding may not exceed 50% in any case.

Furthermore, state venture capital investors provide an option that limits their profit potential on individual investments. One possible exit opportunity is that the target company will repurchase the fund's share at the exit with a defined fixed expected rate of return. Capital investments are often combined with an ownership loan with continuous amortization to the exit. This can be considered as a risk mitigation step, which transforms state capital investments similar to hybrid financing. For these loans a lower interest rate is charged than the level of expected return on the equity. This also creates the opportunity for Hungarian innovative entrepreneurs to be able to establish their company and in the best-case scenario retain the ownership, stay in the country (while most likely conducting export activity) and increase domestic employment and domestic tax revenue. However, drag-along right still can appear even in governmental venture capital investment term sheets (Pintér, 2021).

5.5.5 The present and future of rescue programs

The SARS-CoV-2 virus – more commonly known as the “coronavirus” – and the disease it causes – COVID-19 – disrupted the health and everyday lives of billions of people around the world. Since scientists, health officials and many governments found social isolation to be one of the best available defense strategies against the pandemic, the demand for a large number of products and services diminished. This effected companies relying on personal customer traffic the most such as restaurants, bars, movie theaters, concert halls, gyms, etc. With the reduced traffic, the revenue of these businesses greatly diminished, and the livelihoods of their employees became uncertain. As this could further reduce demand for goods and create a negative feedback loop, it is essential that governments use rescue programs to help boost the economy and businesses in sectors that are more weighted by the crisis.

The Hungarian government launched a massive rescue operation through MFB in April 2020. The initiative provides a total of 1490 bn HUF to companies through three loan, two guarantee and four capital programs.

The **loan programs** provide 439 bn HUF financing, and include the MFB Crisis Loan, the SME Technology Loan Program, and the MFB Competitiveness Loan Program. Companies can apply for the MFB Crisis Loan through financial institutions with a minimum of 1 and maximum of 150 million HUF and a 2,5% interest rate, and can be used for investments, financing working capital and liquidity financing. The MFB Competitiveness Loan is open for large corporations for the same objectives

complemented by the objective of acquisitions. The state guarantees 80% of the loan amount. The SME Technology Loan stands out for having zero interest rate (Bankár Magazin, 2020).

The appointed fund management company for the **capital programs** is Hiventures, except for the Crisis Capital Program II., which was promised to be the subject of a tender that private sector fund management companies could participate in (there is no news about this program). The size, intended target companies, and investment size of the programs can be seen on Table 32.

Table 30: Governmental rescue capital programs in Hungary

Program name	Program size	Target companies	Investment size
SME Rescue Capital Program	41 bn HUF	distressed SMEs without bank financing possibilities	50-250 million HUF
Startup Rescue Capital Program	30 bn HUF	startups with prior venture capital investment	65-150 million HUF
Crisis I. Capital Program	150 bn HUF	SMEs or large corporations	500 million – 15 bn HUF
Crisis II. Capital Program	unknown	SMEs or large corporations	unknown

Source: own editing based on MFB (2020)

Hiventures manages the investment process in a month for these rescue investments, while the duration of a normal investment process is usually 4-6 months for them. In the Startup Rescue Capital Program and the SME Rescue Capital Program they ask for a 1% ownership share in the target companies, which the target company can repurchase based on a 5,1% required return, plus an owner's loan will also be available. The Crisis I. Capital Program finances middle-sized and large corporations with a larger investment related to three objectives:

- First, companies that are negatively impacted by the pandemic and thus cannot count on bank loans receive this investment for restructuring purposes until their position is solidified again.
- Second, this investment helps strategically important corporations acquire companies impacted by the pandemic to avoid them being acquired by foreign investors.

- Third, the program finances the strategically important investments of domestic corporations which would increase the profitability long term but would not be financed by the bank sector in the current situation (Forbes, 2020).

These equity programs are managed by the government-owned Hiventures venture capital fund management company (direct intervention), thus *Proposition 2d – “The government employed direct venture capital intervention in its response to the COVID-19 pandemic” – is supported.*

So far, the present of the rescue programs is cheap loans and guarantee provided by the state through financial institutions, and on the equity side direct intervention through Hiventures, the state-owned venture capital fund management company. The future may still bring the Crisis II. Capital Program to fruition, which was supposed to involve the private sector fund management companies to participate in managing the state-provided funds (indirect intervention). However, there has been no news about the Crisis II. Capital Program since the start of the whole initiative in April, which raises doubts about whether the private sector fund management companies will really be involved.

5.6 Summary

During the development of the Hungarian venture capital market, several stages were identified. The negative effects of the economic crisis of 2008 were mitigated by the growing direct and indirect participation of the state in the domestic venture capital market. The main manifestation of indirect involvement was the EU's Jeremie program, which increased the capital available to SMEs and helped regain market momentum. However, the program failed in a number of its objectives, including funding for early-stage companies most in need of investment and the goal of developing peripheral regions. The program has received further criticism for the lack of transparency in the fund management company selection process. The program did not follow international best practices found in the literature.

In parallel with the Jeremie program, the state intervened directly through the SZTA fund manager. Following the Jeremie program, direct involvement took the lead, with the state providing extensive resources to its own fund management company, Hiventures, and a number of other fund managements in the MFB Group. The Focus Ventures fund managent company is responsible for managing funds that invest only in

a particular domestic city to develop peripheral regions, as well as for a fund that supports sustainable water solutions. SZTA also manages a sustainability and social fund that focuses on investing in companies that generate positive externalities, which is one of the reasons for state intervention in the venture capital market. In response to the COVID-19 epidemic, the state launched rescue programs with loan subsidies, bank guarantees and equity investments. The capital programs, managed by Hiventures, provide investment for start-ups, SMEs and larger companies and mitigate the negative consequences of the epidemic. According to the promise, one of the capital programs will be implemented with the participation of private sector venture capital investors as fund managers (indirect intervention), but no tender has yet been announced.

Table 31: Result table for chapter 5

	Proposition	Supported	Partly supported	Not supported
P1a	The government initially entered the venture capital market to fill the financing gap in the early stage financing segment where private venture capitalists were inactive	X		
P1b	The Jeremie program increased the venture capital investment activity during its course in Hungary.	X		
P1c	The Jeremie program succeeded in its goal of regional development.			X
P1d	The Jeremie program succeeded in financing the early-stage companies that needed the investment the most.			X
P1e	The Jeremie program had positive effects on the target companies.		X	
P1f	The selection of the winning fund management companies of the Jeremie program was a transparent process.			X
P1g	The execution of the Jeremie program followed international best practices.			X
P2a	The domestic government intervened directly at the venture capital market during the course of the Jeremie program.	X		
P2b	The domestic government shifted its focus from indirect intervention to direct intervention following the Jeremie program.	X		
P2c	The strategic goals of the domestic direct governmental intervention include the financing of enterprises providing positive externalities.	X		
P2d	The government employed direct venture capital intervention in its response to the COVID-19 pandemic.	X		

Source: own editing

6 Investment Preferences of Governmental Venture Capital Investors⁵

The investment preferences of venture capital investors have drawn much attention from researchers (Tyebjee and Bruno, 1984; Macmillan et al., 1987; Robinson, 1987; Khan, 1987; Sandberg and Hofer, 1987; Hall and Hofer, 1993; Zacharakis and Meyer, 1995; Muzyka et al., 1996; Zacharakis and Meyer, 1998; Shepherd, 1999; Mason and Stark, 2004; Zacharakis and Shepherd, 2005; Hsu et al., 2014). This interest has been sparked by the findings of Dorsey (1979) and Bruno and Tyebjee (1983) showing that venture capitalists are especially adept at choosing investments. The evolution of this research field followed a methodological evolution and a dissecting of the venture capital investment process, individual papers focusing on investment preferences in particular phases of the process. The literature in its current state focuses solely on the investment preferences of private venture capitalists. This is not a problem in western economies where the majority of early-stage investments come from these private actors. Currently, however, these investments are primarily made by government-sponsored actors in the CEE region (Karsai, 2018; Daszyńska-Żygadło et al., 2016).

Existing theories from the literature tell us that governmental venture capitalists may have different preferences when choosing investments compared to private venture capitalists. More specifically, startups offering broader social benefits – such as job creation or regional development – than just financial returns may be preferred by the governmental venture capital investor (Colombo et al., 2016). Currently, the international literature lacks studies that would investigate this theorized phenomenon using reliable real-time methods, not just the self-reporting of agents. This means that startup entrepreneurs in the CEE region need to have knowledge about the preferences of governmental venture capitalists in order to get funded, given that capital funding is currently available predominantly from governmental venture capital fund managements.

The literature only deals with the preferences of traditional private venture capital investors, who do not invest in these early stages due to known market failures such as information asymmetries and transaction costs (Colombo et al., 2016; Lovas, 2015), so

⁵ I performed this research with Erika Jáki, the resulting study was published in *Vezetéstudomány* (Molnár and Jáki, 2020)

there is a lack of venture capital investment preference research in these early phases. Based on the literature on angel investor preferences, startups cannot prepare for the investment preferences of venture capitalists in the early stage because there are fundamental differences between the characteristics of angel and venture capitalists such as different professional background, portfolio size to be developed and risk management considerations (Hsu et al., 2014; Mason & Stark, 2004). The aim of this research is to help startups better understand what qualities governmental venture capitalists are looking for when investing in the pre-seed, seed, and expansion phases. From a methodological point of view, we used the real-time research method of verbal protocol analysis.

The implications of this research will help startups in assessing their readiness to approach governmental venture capital investors according to the current life cycle stage of the venture and will also help policymakers to get experience-based feedback on the realization of governmental investments. The management team is the most important consideration in the early investment stages since prior literature tells us that in the early investment stages the (mostly angel) investors mainly base their decisions on the quality of the management (Hsu et al., 2014). If governmental venture capital investors invest according to the preference of private venture capital investors, then in the seed and expansion stage the most important quality will be the market, followed by the financials (Zacharakis and Shepherd, 2005; Mason and Stark, 2004; Shepherd, 1999). The outcome of this study may differ from these due to the difference between governmental venture capital and private venture capital investors in terms of industrial focus, the goal of the investment and the regulation of the investment selection process.

6.1 Literature Review

The investment preferences of venture capital investors have been examined by researchers from the early 80's starting in the US, using a variety of methods. The earliest papers used mainly questionnaires and interviews to find out more about how venture capitalists select their target companies. Tyebjee and Bruno (1984) used structured interviews and questionnaires to identify four common factors behind venture capital investment decisions. These are: (1) Market Attractiveness, (2) Product Differentiation, (3) Managerial Capabilities, (4) Environmental Threat Resistance. This work laid the foundation for studies to come by being a vanguard in discovering the main influencer factors. Macmillan et al. (1987) aimed to validate these results on a

larger sample of venture capitalists and found that the most important investment factor was the capabilities of the management consistently. They go on to say that *“irrespective of the horse (product), horse race (market), or odds (financial criteria) it is the jockey (entrepreneur) who fundamentally determines whether the venture capitalist will place a bet at all”* (Macmillan et al. 1987: 10). This result is confirmed by Robinson (1987) who states that the management team needs to be complete and must have acquired its business skills through experience. In addition, he emphasizes the importance of the balance between the technical skills needed for the production or providing the service, entrepreneurial experiences of key players, and the requirements of the specific market. Khan (1987) used a decision-making model to estimate the impact of venture capital decisions on the realized returns. He found that the creativity and resourcefulness of the entrepreneur in addition to the ability to enter new markets in an innovative way is the most significant determinant of the realized profits on the investment. Dávid and Becsky-Nagy (2016) conducted a questionnaire to assess the investment preferences of Hungarian VCs who indicated that they prefer the capability of an investment to generate a return on their investment the most over any other characteristic of an investment opportunity.

All these papers used questionnaires and interviews as data collection method. However, Sandberg and Hofer (1987) warned against the use of questionnaires in studies on venture capital investment preferences because with this method the decision-making process might be falsely simplified. They suggest researchers to use real-time methods, such as observation and verbal protocol as data gathering techniques to study this field. Later, Zacharakis and Meyer (1998) showed that the methods used in earlier works – such as questionnaires and interviews – are most likely biased. The reason for this is that individuals (even experts) are prone to remember their experiences and preferences in a distorted manner (recall bias) or they try to justify their previous actions after the fact (post hoc rationalization). The authors find that it is really hard for venture capitalists to introspect about their own decision-making processes.

This gave rise to the use of verbal protocols as research method in the field, which is a real-time method based on observing the venture capitalists during the investment assessment process. Hall and Hofer (1993) conducted 16 verbal protocols with venture capitalists, observing and recording how they evaluated startup investment proposals. They found that the venture capitalists only read the document until they discovered a critical fault, resulting in immediate rejection. They also concluded that in the pre-

screening phase, the venture capitalists valued the most the quality of the proposal and investor fit. On the second-round assessment, however, venture capitalists valued the startup's recommendations from its partners the most. Zacharakis and Meyer (1995) also used the verbal protocol analysis approach, involving two venture capital firms in their study. The venture capitalists had to in part evaluate their prior investment proposals, and in part evaluate the ones provided by the researchers. They found that the venture capitalists valued the most the innovative qualities of the startup's product or service, and they also concluded that these must be introduced as early as possible in the business plan. Mason and Stark (2004) however not only studied venture capital investment preferences, but compared the investment preferences of business angels, bankers, and venture capitalists using verbal protocol analysis. They found that the venture capitalists valued the market growth potential, market demand, the presence of entry barriers, and the financials of the startup (such as financial ratios, company value and expected return on exit) the most. They didn't find the quality of the management team to be of much importance for venture capitalists, which already contradicts the findings of the questionnaire-based studies of the 80's. This chapter builds on the preference comparison approach used by these authors. There have been other applications of verbal protocol analysis in the study of investment decision making processes in the early stage angel investor segment (Smith et al., 2010; Harrison et al., 2015; Mason and Botelho, 2016).

Apart from verbal protocol analysis, another research method also became favored by researchers of the venture capital investment decision topic, namely conjoint analysis. With this method, researchers pose a series of investment decision-pairs to the venture capitalists that differ in terms of various pre-defined qualities, and the venture capitalists are asked to choose between them. The results are statistically analyzed to find the main factors behind investment decisions. This method also provides a solution to the recall bias and post hoc rationalization problems, but the gathered data is less information-rich than the data collected by verbal protocol analysis. Muzyka et al. (1996) conducted conjoint analysis using data collected from European venture capitalists who had to choose between 53 paired investment opportunities. They found the leadership capabilities, experience, and sales skills of the management team and the sustainability of the market share to be the most sought-after qualities by the venture capitalists. Shepherd (1999) also used conjoint analysis on data collected from Australian venture capitalists and found the industry experience and education of the

management team and the strength of the competitors to be the most relevant factors. In their conjoint analysis study, Zacharakis and Shepherd (2005) found the same factors to be strong in addition to product differentiation and market growth potential. Finally, using conjoint analysis Hsu et al. (2014) found that angel investors place more emphasis on strategic readiness and affective passion than venture capitalists, who prefer economic potential.

6.2 Research goals

This research examines the investment preferences of governmental venture capital investors in general and separately in pre-seed, seed and expansion stage investments using the real-time research method of verbal protocol analysis. This research provides a much-needed extension to the current literature on venture capital investment preferences by aiming to answer the following research questions.

Table 32: Research questions for chapter 6

RQ1: What qualities do governmental venture capital investors seek overall in the target company?
RQ2: What qualities do governmental venture capital investors seek in pre-seed ventures?
RQ3: What qualities do governmental venture capital investors seek in seed ventures?
RQ4: What qualities do governmental venture capital investors seek in expansion-stage ventures?
RQ5: How much do governmental venture capital investors value innovation in the target company?

Source: own editing

One aim is to explore which qualities the governmental venture capitalists value overall. The governmental venture capital investors are expected to overall have similar investment preferences as private venture capital investors. Based on the literature this leads us to expect governmental venture capital investors to value the market characteristics the most, followed by the financials (Zacharakis & Shepherd, 2005; Mason & Stark, 2004; Shepherd, 1999).

Pl1a: Overall, the governmental venture capital investor values the market followed by the financials of the target company the most.

Additionally, using EU funds the Hungarian government launched the GINOP program as part of the 2014-2020 programming period with the explicit aim of developing the innovational capabilities of the country (Palyazat.gov.hu, 2014). Many

of the subprograms include investments into governmental venture capital funds, this leads to the assumption that overall governmental venture capital investors value highly the innovational quality of the product or service of a target company.

P1b: Overall, the governmental venture capital investor values the innovational value of the product highly within the product / service category.

It is also expected to see variations in the results of the three investment phases. In the pre-seed segment, a good indicator of the governmental venture capital investor's preferences can be the criteria used by angel investors, who invest in the earliest life cycle stage companies. Angel investors are highly influenced by the personal qualities of the entrepreneur in their investment decision because the problem of information asymmetries is very prevalent in the pre-seed phase (Hsu, 2014). The management team is expected to be the most important consideration in the early investment stages since prior literature tells us that in the early investment stages the investors mainly base their decisions on the quality of the management, since there is very little information available about the history of the company, thus it is hard to rely on financial data or projections (Hsu et al., 2014). Additionally, business plans formed in this stage can't be very precise, since even the product or service of the company is not finalized yet, leading us to expect that investors don't place a big emphasis on the quality of the business plan in this phase. From this, the following proposition can be drawn: if the governmental venture capital investor faces similar problems in the pre-seed investment phase as angel investors, then it will follow a similar preference structure by placing the highest importance on the management of the target company and less importance on the business plan and the financials.

P2a: In the pre-seed phase, the governmental venture capital investor values the management of the target company the most

P2b.: In the pre-seed phase, the financials of the company are among the least valued characteristics by the governmental venture capital investor.

P2c: In the pre-seed phase, the business plan of the company is among the least valued characteristics by the governmental venture capital investor.

Traditional venture capital investors don't invest in pre-seed companies due to the high transaction cost of making an investment and the lack of economies of scale in small investments, so they prefer more developed startups who require larger investments. Thus in the seed and expansion stages the governmental venture capital investors are expected to invest according to the preference of private venture capital

investors, but with a slight difference: while private venture capital investors don't value the quality of the business plan very much (Zacharakis & Shepherd, 2005; Mason & Stark, 2004; Shepherd, 1999), the governmental venture capital investors can be expected to value it to a great degree since it is known that venture capitalists connected to the government are subject to increased levels of bureaucracy (Karsai, 2017a), and this could manifest in their increased attention to the business plan structure as the basis for further record-keeping.

P3a: In the seed phase, the governmental venture capital investor values the market followed by the financials of the target company the most.

P3b: In the seed phase, the governmental venture capital investor values the business plan of the target company among the top three characteristics.

P4a: In the expansion phase, the governmental venture capital investor values the market followed by the financials of the target company the most.

P4b: In the expansion phase, the governmental venture capital investor values the business plan of the target company among the top three characteristics.

The difference between governmental venture capital and private venture capital investors in terms of industry focus, the goal of the investment and the regulation of the investment selection process may lead to their preferences diverging. The implications of this chapter will help startups in assessing their readiness to approach governmental venture capital investors according to the current life cycle stage of the venture and will also help policymakers to get experience-based feedback on the realization of governmental investments.

6.3 Methodology

In this section, the data collection and data analysis techniques are introduced.

6.3.1 Data collection

The sample – collected in the spring of 2018 – comprises of nine Hungarian governmental venture capital investment managers. Three were investing in pre-seed startups, three investing in seed startups and three investing in 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 confidential nature of these investments, we didn't have an opportunity for random sampling. 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 proficient with evaluating 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 different life cycle stages.

Each verbal protocol interview was an hour long, during which two verbal protocols were completed successfully. This gives 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. Additionally, 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 the sample size of the chapter is on the larger end for this type of methodology. Also, 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. The procedure for conducting a verbal protocol is the following (Ericsson & Simon, 1993), which we followed precisely during the analysis:

- 1) Before the start of the experiment, it must be made clear to the subjects that they must continuously articulate their thoughts out loud during the experiment,

including anything that comes to their mind. If the subjects are silent for more than 30 seconds, the researcher must remind them to continue articulating their thoughts.

- 2) Before the start of the experiment, it is advised to do a test run, solving an easy math problem as an example. The researcher can ask the subject to perform a simple mental addition but say every emerging thought out loud while performing the task. This way, the subject can get some experience before the start of the experiment.
- 3) Perform the verbal protocol experiment, record what was said on tape.
- 4) Transcribe the recordings to start the analysis.

These principles were followed closely in the research. 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, provided that the following criteria are met (Ericsson & Simon, 1993). In this study, all of these criteria were met, see the table below.

Table 33: The implementation of verbal protocol analysis criteria

<i>Criteria</i>	<i>Implementation in this research</i>
The information reported must be the focus of attention	Each interview was made in an undisturbed, silent, closed office room with only the interview subjects and researchers present
Subjects are free from distraction	
The task is not highly routinized by habit	Real business plans from various industries were used

There must be only a short time between performance and verbalization	The subjects continuously articulated their thoughts out loud during the evaluation of the business plan, the subjects were reminded to continue articulating their thoughts after being silent for 30 seconds
Verbalization does not require excessive encoding	The subjects articulated their own thoughts as they came to their mind
Reports are oral	The interviews were conducted personally
Instructions are clear	At the beginning of each interview, clear explanations were given on the method and the aim of the study
Completeness in reporting is encouraged	Each business plan evaluation was complete

(Source: own editing)

6.3.2 Data analysis procedure

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 research uses categories inspired by them to answer the research questions (see the table below).

Table 34: Qualitative properties used as categories

Management team	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 each type of governmental venture capital investor (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 and it is present in numerous studies that 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 behavior of the subject (Mason & Stark, 2004).

6.4 Results

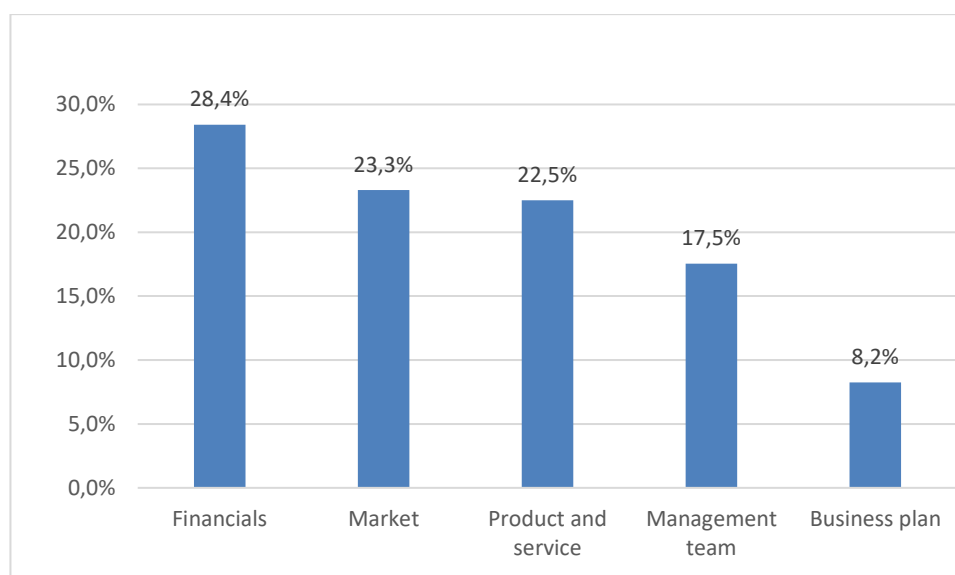
Each governmental venture capital investor type (pre-seed, seed, and expansion) evaluated six different startup business plans and their thoughts segments were linked to five categories: financials, market, product and service, management team and business plan. At the table below we can see the frequencies of the thought segments in each category in total and per life cycle stages.

Table 35: 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)

Figure 16: Overall investment preference hierarchy based on verbal protocol analysis

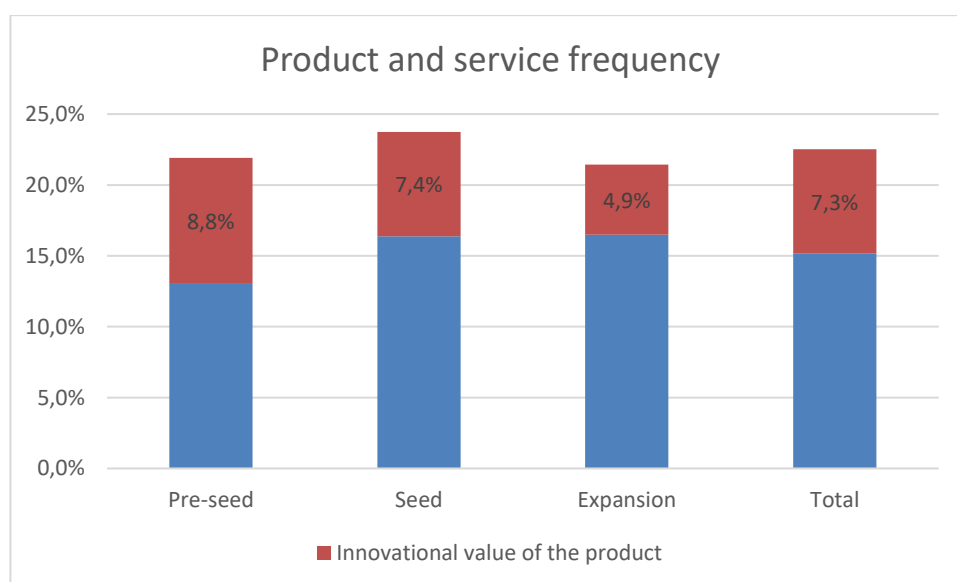


(Source: own database)

When we look at the overall results (RQ1), we see that the governmental venture capital investors valued the financials of the company the most (28,4%), followed by the market (23,3%) which is the complete opposite of the preferences of private venture capital investors, who generally value the market the most followed by the financials (Zacharakis & Shepherd, 2005; Mason & Stark, 2004; Shepherd, 1999). This result *does not support the Proposition 1a*– “Overall the governmental venture capital investor values the market followed by the financials of the target company the most”. The reason behind this can be the very strict state oversight that governmental venture capitalists operate under which requires them to closely follow financial guidelines

when selecting target companies. The market and product/service are almost equally important in the evaluations process. The high ranking of the product/service is interesting because there is evidence in the literature that venture capitalists don't value it highly – for example Mason and Stark (2004) found it to be one of the least valued characteristics. The reason behind this ties into RQ5 and P1b, which states that “overall the governmental venture capital investor values the innovational value of the product highly within the product / service category”. As it turns out, the contribution of observations about the innovational value of the product makes up a large portion of the total observations about the product, as seen on the following chart.

Figure 17: The share of innovation related observations within the product and service category based on verbal protocol analysis



(Source: own database)

It is also noteworthy that the governmental venture capitalists talk about the innovational value of the product relative to all product related observations the most in the pre-seed phase (40% share), and less in the later phases (seed: 31% share, expansion: 23% share). This can be explained by the fact that in the earliest phases there is less market validation available about the company, which places more responsibility on the venture capitalist to determine if there is innovation in the product or not. In an expansion stage company, the innovation is already market-tested, thus there is less need to analyze it. Overall, this supports Proposition 1b – “Overall the governmental venture capital investor values the innovational value of the product highly within the

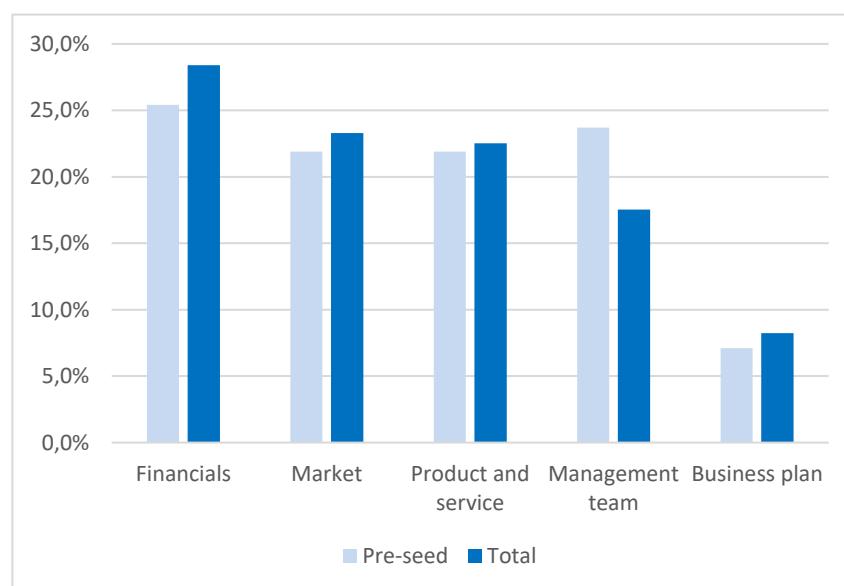
product / service category”. Combining the two findings that (1) the governmental venture capitalist places large emphasis on the quality of the product/service and (2) within the product/service category, the analysis of the innovational value makes up a large portion, leads to the finding that the governmental venture capital investor values the innovational value of the product highly.

In the overall ranking the quality of the business plan (8,2%) achieves the lowest importance. Thus, startups looking for state investment must be aware that their company must have very good financial prospects in order to get funded. In the following sections the results of the three investment phases will be analyzed, where some variation may arise.

6.4.1 Pre-seed

This section presents the characteristics that governmental venture capitalists seek in pre-seed phase enterprises (RQ2). Surprisingly, the most discussed criterion of the pre-seed governmental venture capital investors was the financial characteristics of the company (25,4%) again, closely followed by the management team (23,7%). However, the management proved to be the most discussed factor of the pre-seed governmental venture capital investors when compared with the others (seed: 13%, expansion: 15,4%).

Figure 18: Pre-seed stage and overall investment preference hierarchy based on verbal protocol analysis



(Source: own database)

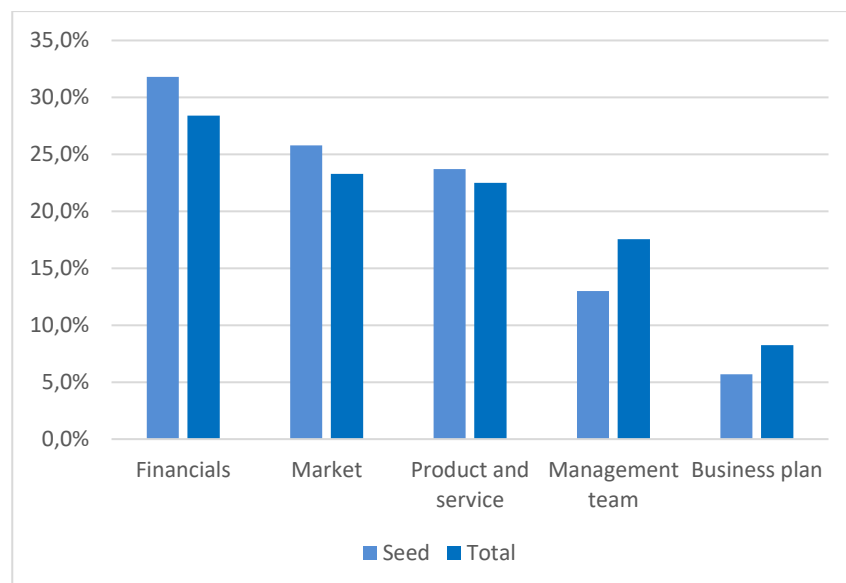
Proposition 2a – “In the pre-seed phase, the governmental venture capital investor values the management of the target company the most” – is partly supported, since the management team was the highest valued characteristic compared to the other investment phases, but it was not the absolutely highest valued in the pre-seed phase. The issue of planned equity shares of the key players is a relevant topic in this life cycle stage also. The importance of the financials suggests that governmental venture capitalists place a big emphasis on the profitability and return potential of a startup even in its infancy stage. Within this category, the governmental venture capitalists gave special attention to the composition of the equity holders. The governmental venture capitalists placed equal emphasis on the market and the product considerations (21,9% both). These are still relatively high weights, and several business plans were criticized for the lack of diligent market analysis, regarding especially the identification of competitors. In some cases, even the gathering of market feedback was appreciated. In terms of the product, the governmental venture capitalists seemed to focus most on the innovational value, “*looking for something that hasn’t been done before a million times*”. Innovativeness was shown to be a key driver of entrepreneurial growth by Czyżewska et al. (2016). We found evidence that the pre-seed governmental venture capital investment managers operate according to an entirely different preference structure than the private venture capital investors. The financials of the company are the most important quality in an applicant startup followed closely by the management team. The importance of the management team in this phase resembles the investment preference of angel investors (Hsu et al., 2014; Mason & Stark, 2004). This is most likely due to the fact that in the pre-seed phase (where angel investors are also active) the investors must base their decision on the perceived capabilities of the management, as in this very early phase there are very few verifiable information available about the project, which leads to informational asymmetry. This makes the importance that governmental venture capitalists place on the financials of the company even in the pre-seed phase even more surprising, thus *Proposition 2b – In the pre-seed phase, the financials of the company are among the least valued characteristics by the governmental venture capital investor – is not supported.* This strengthens the prior explanation, that since governmental venture capital investors spend the resources of the state, the accountability of governmental venture capital investors is elevated, and their investment decision is supported by the estimated financials of the business plans. This finding persists through all three life cycle stages.

The qualities attached to the structure and flow of the business plan were under minimal scrutiny in the pre-seed category (7,1%), thus *strong support is found for Proposition 2c – “In the pre-seed phase, the business plan of the company is among the least valued characteristics by the governmental venture capital investor”*. This is understandable since at this early stage, the length of the required plan is much shorter than in the later stages.

6.4.2 Seed

We now look at what qualities do governmental venture capital investors seek in seed ventures (RQ3). The most scrutinized factor is clearly the financials (31,8%) once again. The financial plan, especially the price and the cost structure are the subjects of most of the criticism.

Figure 19: Seed stage and overall investment preference hierarchy based on verbal protocol analysis



(Source: own database)

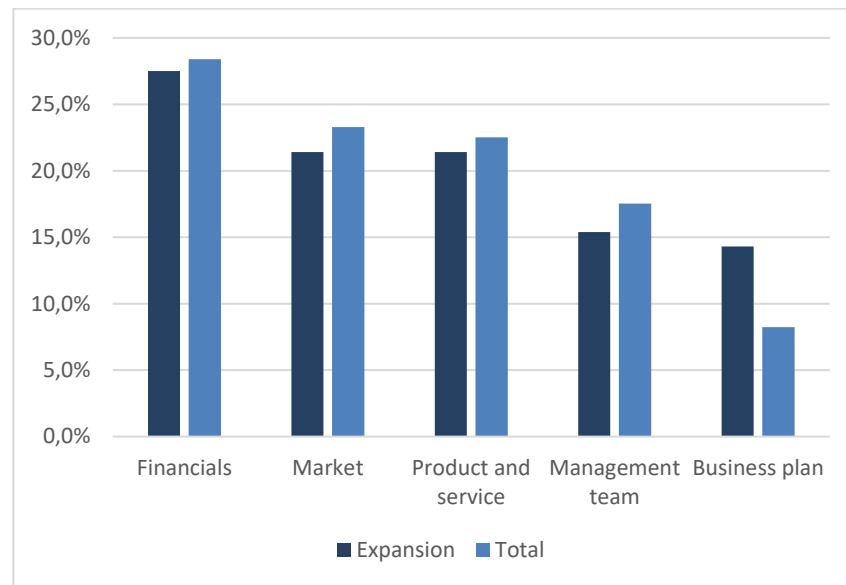
Since the financial criteria of the seed stage startup are more evaluable than in the pre-seed stage (however still very hard to forecast because of the lack of substantial historical data), it is understandable, that a detailed financial plan for the near future becomes a more significant criterion. The other two main factors in the seed investments were the market (25,8%) and the product (23,7%) with the management team (13%) and business plan (5,9%) coming in at the end. It was very interesting to see the management team achieving such a low importance in the seed stage, this resembles

the findings of prior verbal protocol studies (Hall & Hofer, 1993; Zacharakis & Meyer, 1995; Mason & Stark, 2004) on the governmental venture capital investment preference indicators, and as they also suggest, is in stark contrast with previous post-hoc studies (Tyebjee & Bruno, 1984; Macmillan et al., 1987; Robinson, 1987; Khan 1987). However, *Proposition 3a – “In the seed phase, the governmental venture capital investor values the market followed by the financials of the target company the most” – can not be supported.* This proposition was formed supposing that governmental venture capitalists follow the investment preference structure of private venture capitalists in the seed and expansion stage, but they place a higher emphasis on the business plan than private venture capital investors. The results show that the governmental venture capitalists of the research value the financials and the market the other way around (financials the most, followed by the market), which further confirms the high regard to the financials of the company by governmental venture capitalists, suggesting the need to follow a strict financial evaluation process in selecting target companies, as to comply with state regulations. The quality of the business plan was the least valued characteristic (5,9%), which means that *Proposition 3b – “In the seed phase, the governmental venture capital investor values the business plan of the target company among the top three characteristics” – can not be supported.* This essentially means that governmental venture capitalists are free to place more emphasis on the factors that are important regards to the business, and they don’t have to scrutinize over the business plan structure too much, which is very consistent with the way private venture capitalists value this characteristic. From this it can be concluded that the state-controlled nature of governmental venture capitalists materializes in their focus on the financial prospects of the business plan and not in a focus on the structure and general quality of the business plan. This is another finding that startupers might keep in mind when applying for governmental venture capital financing.

6.4.3 Expansion

Next let us look at the qualities governmental venture capital investors seek in expansion-stage ventures (RQ4). The results of the expansion stage evaluations resemble those of the seed ones in the sense that the financials of the company are the most important (27,5%), followed by the market (21,4%), but in this category, the product or service holds the same importance as the market (21,4%).

Figure 20: Expansion stage and overall investment preference hierarchy based on verbal protocol analysis



(Source: own database)

Similarly to before, this result *does not support Proposition 4a* – “*In the expansion phase, the governmental venture capital investor values the market followed by the financials of the target company the most*”. However, the construction of the business plan (14,3%) has a much higher importance in this phase compared to the other phases which can be attributed to the business plans being the longest at this life cycle stage, so there is more opportunity to criticize their structure and flow. However, *Proposition 4b* – “*In the expansion phase, the governmental venture capital investor values the business plan of the target company among the top three characteristics*” – *is still not supported*, since the business plan is not in the top three most valued characteristics). Thus, entrepreneurs applying for expansion stage governmental venture capital financing must expand more resources to construct the business plan expertly compared to the earlier stages, but still can expect to receive relatively little criticism connected to the quality of the business plan. The following table contains the results associated with the propositions.

Table 36: Result table for chapter 6

	Proposition	Supported	Partly supported	Not supported
P1a	Overall, the governmental venture capital investor values the market followed by the financials of the target company the most.			X
P1b	Overall, the governmental venture capital investor values the innovational value of the product highly within the product / service category	X		
P2a	In the pre-seed phase, the governmental venture capital investor values the management of the target company the most		X	
P2b	In the pre-seed phase, the financials of the company are among the least valued characteristics by the governmental venture capital investor			X
P2c	In the pre-seed phase, the business plan of the company is among the least valued characteristics by the governmental venture capital investor	X		
P3a	In the seed phase, the governmental venture capital investor values the market followed by the financials of the target company the most			X
P3b	In the seed phase, the governmental venture capital investor values the business plan of the target company among the top three characteristics			X
P4a	In the expansion phase, the governmental venture capital investor values the market followed by the financials of the target company the most.			X
P4b	In the expansion phase, the governmental venture capital investor values the business plan of the target company among the top three characteristics			X

(Source: own editing)

6.5 Summary of investment preferences of governmental venture capitalists

This section will give guidelines for startups looking for venture capital financing based on the observations along the five investigated categories.

Starting with the **product and service** category, investment managers often stated that before the product description the entrepreneur should exhibit the general market problem and explain how their product or service can provide the solution to this

particular problem. Without this, the startups risk appearing ignorant of the core need for their product. Also, there is an entrepreneurial technique highly criticized by the investment managers: the entrepreneurs occasionally try to present their product or service as being perfect, void of any flaws. According to the verbal protocols, this raised a red flag for the investment managers, and they immediately appeared suspicious. Products always have shortcomings, and the startup must show these also to appear diligent and believable. Finally, the innovational value of the product or service was questioned many times during the verbal protocols, for example as: *“it didn’t have anything unique. They sensed that there is money in the industry, but they failed to identify how to get a foothold in the industry using an innovation”*.

Regarding the **market-related** observations, the most important element the investment managers looked for is the ability of the startup to show that there is a demand on the market for their solution as it was mentioned also in the product and service section. According to this research, this starts with the correct identification of the target market. If the sales model is business to business (‘B2B’), then in the market introduction it should be exactly introduced which companies are interested in the startup’s solution. If the target market has multiple segments, then this should be clearly identified. If the startup aims to create a new market segment that didn’t exist already, then the potential demand should be clarified. Startups can acquire this knowledge by conducting a market study. The depth and detail of this vary across the three investment categories. Even *pre-seed* companies should conduct the short market study in which the size of the market, the major competitors, the strategy to enter the market, the barriers of entry and some measure of potential customer feedback should be presented. If the firm already has supporters, that is a benefit as well. In the *seed* investment category, investment managers emphasized that the market study must be based on publicly available data and must be justified. The market tendencies, market structure, the percentage share of the existing market participants and their pricing power should be demonstrated. The potential answer of the competitors to the new market entry is also important. It is a great advantage if the seed company has already contacted market advisors for their opinion on market prospects. Entrepreneurs at expansion-stage companies must additionally prove that they understand the difference between the complete market, target market and the market for imminent entry. Finally, an expanded level of market feedback is also required of them, since in this phase the company has already tested their product or service.

The core competencies of the **management team** are the most vital qualities that investment managers looked for. Core competencies can be the skills or knowledge of the team that is the source of the startup's competitive advantage. For example, in a tech startup, the software developers who will deliver the software product that is the main offering of the firm possess a major part of the core competencies. Naturally, there are other required competencies, such as business knowledge, marketing, finance and so on. Essentially, the investment managers wanted to make sure, that the people in possession of the core competencies were invested in the company's success. This is primarily done by giving them an appropriate share in the firm's equity. If, however, they are merely employees and not shareholders, then larger competitors can easily recruit away these key players, severely undermining the future of the firm. Therefore, business plans in which the founder wanted to retain all the equity share were strongly criticized for it. Investment managers also found the presence of 'silent partners', shareholders with no active role in the startup unacceptable, since it limits the shares of the firm available to key players thus limiting their commitment to the firm's success. Additionally, the management team must be able to dedicate the majority of their time to the project. Furthermore, their enthusiasm should suggest that they would do the project even if they couldn't secure external financing.

Finally examining **financial** considerations, based on the investment managers' comments, the single most important quality is the 'scalability' of the business. In venture capital jargon, a scalable project can sustainably increase the sales volume, while keeping the marginal cost low, thus retaining a high profit margin. Typical scalable enterprises are technological companies, for whom an additional customer only adds a tiny server cost while the normal subscription fee is applicable to all customers. It is also much easier for them to support a very fast-growing user base. This characteristic makes 'tech' companies favoured targets of venture capital investors. Typical non-scalable projects are usually startups planning to sell physical products or local personal services. Since these projects have substantial marginal costs and face capacity constraints when the sales volume would increase dramatically, procuring financing from venture capitalists can be especially difficult for these startups. Additionally, startups planning ad revenues as the sole form of income were criticized. For a startup to grow into a valuable company employing only ad revenues, it would take building a very substantial user base, the success of which seemed highly unlikely for the investment managers. The investment managers also wanted to see that the

applicants planned to enter foreign markets, or the global market eventually. The financial plan's numbers must be based on evidence and should be detailed and justified in the written business plan. Some financial plans were also criticized for overcomplicating the price structure. *"The simplicity of this is important because we need to sell... If the price structure is hard to understand, that can lead to a loss of market, because the partners don't understand it."*

Additionally, many observations were made in reference to the '**exit**', the final sale of the venture capital's equity share. Even in the pre-seed category, investment managers greatly appreciated the presence of an exit-plan for the venture capital in the business plan. This proves that the founders know the major players in their industry and that there is demand for the startup by one or more of the major players. It is also a significant help for the investment managers since reading this helps them formulate a strategy for exiting the investment. On the other hand, if there is not even a mention of potential exit opportunities, then the chances of acquiring the venture capital financing can be significantly reduced.

Analyzing the interviews, it is clear that the overall quality, style, and structure of the **business plan** must be concise, factual, and straightforward. Startups were criticized for writing long, empty sentences about nothing. Even in the pre-seed category, investment managers emphasized that they require every major statement to be supported by evidence, so collecting references, sources while writing the business plan is a must. In the expansion category, special consideration is attached to the overall structure of the business plan. *"The business plan resembles a patchwork, this poses sales issues. It seems like they are trying to involve a new partner in something that is not a coherent whole."* This is also important for proving to the venture capital that the entrepreneurs are capable of structural thinking. Also, the writing style of the business plan must be coherent. If the investment manager can detect that different sections of the plan were written by individuals with vastly different styles or thinking patterns, this can contribute to the feel of 'patchwork'. The investment managers appreciated wherever the business plan conveyed information through graphical means. However, several business plans were criticized for employing 'buzzwords' in large quantity, in an attempt to make the project look trendy or cutting edge. This practice should be avoided as venture capitalists can see through this and evaluate the project on its own merits. Finally, the executive summary of the business plan received much of the

attention, and the business plan should follow the structure laid out in the executive summary.

Overall, the business plan should submit all the numbers in the financial plan based on evidence and the founders must have convincing answers to all of the following questions, preferably mainly based on publicly available data:

- Size of the target market. What portion of that does the startup plan to capture for itself and in what timeframe is this possible.
- Which core competencies enable the startup to carve out this portion of the market and how can the startup protect it from the competitors.
- Taking into account the entry barriers, the patents and the strength of competitors, how long can it hold onto its market share.
- What actions does the startup plan to ensure to keep and potentially grow the market share.

6.6 Summary

This research has examined the differences in investment preferences across three distinct investment categories of Hungarian governmental venture capital investors across the pre-seed, seed and expansion life cycle stages, conducting three verbal protocol interviews in each, and since all investment managers evaluated two business plans each, 18 total evaluation interviews were conducted. Each interview lasted an hour and took place in undisturbed circumstances. Regarding the selection of the investment managers, the quota sampling method was used in combination with reputation-based sampling to achieve the best generalizability in each life cycle stage. With the use of verbal protocol analysis, it was possible to capture the actual investment screening procedure of the governmental venture capitalists in real-time. This eliminates the recall bias associated with earlier post-hoc studies, which essentially based their conclusions on the venture capitalists' potentially flawed recollection of their previous investment choices. Another issue of these studies is the post-hoc rationalization, which causes individuals to come up with reasons to justify their prior decisions. Although verbal protocol analysis has its own inherent faults (most prominently, the relatively low number of verbal protocols that can be reasonably conducted), still it is widely used next to conjoint analysis to examine venture capital investment decisions.

The main finding is that overall governmental venture capitalists valued the financials of the company the most. This was followed by the market and the product

criteria in the seed and expansion stages. Meanwhile in the literature private venture capital investors valued the market characteristic above the financials in an opposite way. This is probably due to the considerable state oversight over governmental venture capital investors, who have to follow certain financial requirements when choosing investments. In the seed and expansion stages the management team was not an essential aspect of the evaluations, it only proved more important than the construction of the business plan. The fact that the management achieved such a low priority show a resemblance to findings of previous real-time studies on the private venture capital investment decisions (Hall & Hofer, 1993; Zacharakis & Meyer, 1995; Mason & Stark, 2004). In the pre-seed stage, the situation is completely different: here the most important aspects of the examined startups were still the financials, but closely followed by the management team. The high importance of the management team can be attributed to the lack of an operational history. The investment managers must base their decision more on the capabilities of the management rather than the business idea or the financial data, while the business plan is also very short. Ultimately, in this early stage, the management must convince the venture capitalist that they can indeed realize the startup venture. Essentially, in this stage the governmental venture capitalists adopt some characteristics of the angel investors, namely the preference for a convincing management team (Hsu et al., 2014; Mason & Stark, 2004), while keeping the highest regard for the financials of the company, which is the most important quality that the governmental venture capitalists look for in every life cycle stage. The quality of the business plan was the least important quality in all three life cycle stages, which is consistent with the way private venture capitalists value it (Hall & Hofer, 1993; Zacharakis & Meyer, 1995; Mason & Stark, 2004). Based on the research the 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. This is consistent with the aims of the governmental program that contributed funds for governmental venture capitalists to invest.

This chapter presented information about the investment preferences of governmental venture capital investment managers in three different life cycle stage specializations. Examining our results, startups seeking financing will find information on what to do and what to avoid in the business plan. The main limitation of this study is the focus on the Hungarian venture capital market. Other researchers are also encouraged to use verbal protocol analysis to examine the governmental venture

capitalists in their country of origin as well, this would help to identify geographical and temporal characteristics – this is still a relatively under-researched field. Additional possible research questions include: how do governmental venture capital investors evaluate pitch presentations, what support can entrepreneurs expect from a governmental venture capital investment other than financial support and based on what metrics do governmental venture capital investors evaluate the success of their investments.

7 Conclusions, further research directions and key findings

The aim of this dissertation was to map the role of state venture capital in the startup ecosystem, examine the state of the Hungarian startup ecosystem and explore the decision-making and investment preferences of Hungarian state venture capitalists. The dissertation started by defining the startup ecosystem and presenting a holistic overview of the ecosystem members. This was followed by four major studies examining the Hungarian startup ecosystem and the role of state venture capitalists.

The intervention of the government at the venture capital market was spurred by the equity financing gap present at the early-stage financing segment. Seed stage companies looking for financing face significant difficulties. This is caused by two major market failures: asymmetric information, and the presence of transaction costs. Since seed stage companies have no track record or market feedback, it is very difficult for investors to estimate their chances of success. This effect is amplified by the obvious disparity in the information available to the startup founders and to the investors, and thus the resulting informational asymmetry severely hinders their financing opportunities. Furthermore, these seed stage companies only require a small amount of investment initially, which many of the traditional venture capital fund managements find inefficient to supply. This is because fund management companies have large transaction costs on each investment, which can be regarded as fixed costs since they are mostly the same without regard to the investment size. These costs come from the salary to the various experts involved in the investment process, such as investment managers, risk experts, the decision-making committee or board which makes the final investment decision, and portfolio management staff. It is clear to see how under a certain investment size it is just not economical for a venture capitalist firm to invest in seed-stage companies. This is a major problem, since without these early-stage investments, it is difficult to maintain a high level of national innovation. These market failures combined with the positive externalities that startups generate are the reason for the governments' entry to the startup financing market. The positive externalities generated by startups include employment growth, tax income growth, regional development and in some cases the support of sustainable development in addition to innovation.

In the dissertation I presented the results of our research on the current state of the Hungarian startup ecosystem. Members of the Hungarian ecosystem were interviewed

with a questionnaire, in which a high participation rate was achieved. In this study, we presented the views of several stakeholders in the Hungarian startup ecosystem on the state of the ecosystem. Based on a qualitative, systematic review of the literature, we analyzed the most important research streams in the field of public venture capital research, categorizing the results of various studies in a multidimensional way. This research chapter explored the positive and negative effects of several types of public venture capitalist interventions using geographically diverse data sources. Recommendations to the decision-makers of state venture capital programs were also highlighted, thus establishing the analytical framework for the intervention of the Hungarian venture capital market and the Hungarian state.

The Hungarian venture capital market and the domestic governmental interventions were presented next. This chapter started by reviewing the early evolution of the domestic venture capital market and the reason for the Hungarian governments' entry to the market. Then the two major forms of intervention – indirect and direct – of the Hungarian government were presented in detail. First, the Jeremie program was analyzed and evaluated as the major domestic indirect form of governmental intervention. The execution of the program was compared to the international best practices identified in the previous systematic literature review. Then the various fund management companies and funds were presented which are the vehicles of the direct form of the Hungarian governmental venture capital intervention. Special attention was paid to the goals of the managed funds and to the most recent rescue programs aimed at alleviating the negative effects of the COVID-19 epidemic.

Finally, the dissertation investigated the preferences of Hungarian venture capital investors. The investment preferences were evaluated in the pre-seed, seed and expansion phase of the startup life cycle and compared with the preferences of private sector venture capital investors and angel investors. The most important criticisms by governmental venture capital investors were also identified in each preference category.

As the leading country of the CEE region in terms of venture capital investment, Hungary proves to be an ideal setting for the study of the startup ecosystem and the role of governmental venture capital in it. This dissertation is aimed to help researchers, policymakers, investors and startupers understand the domestic startup ecosystem better. 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 rather using metrics that can better capture its original aim of closing

the equity gap in early-stage financing and supporting national strategic objectives. The development of such a measurement methodology would help to show the true effects of the governmental venture capital intervention and also help to improve the accountability of governmental venture capital programs.

7.1 Novel and semi-novel contributions of the dissertation

The research contained in this dissertation contributes the following novel and semi-novel findings to the startup ecosystem and governmental venture capital research fields.

1. The Hungarian startups 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 startups 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.
2. We showed which qualities do the Hungarian startup ecosystem members find the most important in a startup ecosystem and also their rating of 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 poor (opportunity to start again after failing a startup). Interestingly, 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). Startups 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 startups. The members of the Hungarian startup ecosystem rated the general strength of the ecosystem as average (acceptable).
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. The effect of purely governmental venture capital (direct intervention) is a very debated topic in the literature, the findings vary geographically. While it was found to be inefficient in the EU, evidence from the US, Thailand, Israel, and South Korea show the contrary. Governmental and private venture capital partnerships are generally regarded as effective except for the CEE region where the implementation of these programs received much criticism. The governmental support for pre-seed companies by financing incubators and business angels was almost exclusively praised by the authors examining its effects. Coincidentally, governmental intervention is most justified in the sector of pre-seed and seed financing.

4. We summarized the recommendations of researchers for governmental venture capital programs. Governmental venture capital programs should not compete with each other, they should be accountable, they should support the target companies during their whole life cycle, 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, and they should let regional institutions handle the allocation of funds meant for regional development.
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.

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. Most recently, governmental direct venture capital intervention also started to help alleviate the negative effects of the COVID-19 pandemic on domestic companies.
7. We uncovered the investment preferences of governmental venture capital investors: 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 case of seed and expansion stage companies, they value financial and market-related qualities the most, while private venture capitalists value them the other way around. This is most likely the consequence of the high level of state oversight under which they operate, thus they must follow certain financial requirements when choosing investments. 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.
8. The governmental venture capital investor is 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.

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