

# Funding gap in the Hungarian venture capital market

Póra, András<sup>1</sup>, Szócs, Árpád<sup>2</sup>

## Summary

Our study investigates the size of the so-called financing gap in the Hungarian venture capital market, i.e. the amount that can potentially be lent out, which is currently not covered by the Hungarian financial intermediary system on a market basis. The relevant literature will be reviewed to assess the performance and characteristics of the Hungarian market. The Hungarian financial intermediation system, traditionally based on banking, underperforms in all segments of capital market financing, even by Central and Eastern European standards. In our research, we sought to find out whether the available sources of venture capital could meet market needs. Both the number and volume of transactions in the domestic venture capital and private equity markets are low by international standards, and the role of the state is below the average for CEE countries. The novelty of our analysis lies in the fact that there is no similar literature available in Hungary. Our estimation based on linear regression revealed a strong relationship between venture capital investment and current GDP. The difference between the estimated potential risk capital stock and the annual averages zrealized clearly shows the market gap. In addition to the public programmes already implemented, the annual amount of risk capital missing from the domestic market is in the order of EUR 12.5-31.6 million, i.e. roughly HUF 5.1-13.3 billion per year at the euro exchange rate at the time of analysis. If this resource were available, domestic startups would have greater growth opportunities. Our analysis suggests that not only a state presence but even an increase in it, seems justifiable (or at least worth exploring). The research was supported by the National Research, Development and Innovation Office (FK-142492).

**KEYWORDS:** financial intermediary system, risk capital, financing gap, state aid schemes

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- 1 Egyetemi tanársegéd, Pénzügyek tanszék, BME Gazdaság- és Társadalomtudományi Kar, [pora.andras@gtk.bme.hu](mailto:pora.andras@gtk.bme.hu)
  - 2 Budapesti Műszaki és Gazdaságtudományi Egyetem [szocsa@edu.bme.hu](mailto:szocsa@edu.bme.hu)

In the literature, financial intermediation systems are usually divided into banking and market-based systems based on their historical development. The traditional actors in the financial intermediation system are (commercial) banks, one of whose principal activities is deposit taking and lending (Szüle, 2019). In bank-based systems, banks are, by definition, the most important players in financing companies, while bond and equity issues play a minor role. In countries with a market-based financial system, securities play a larger role in corporate finance, while banks are the primary providers of finance to retail customers and small and medium-sized enterprises. The countries with bank-based intermediation are Austria, Germany and Japan, while those with market-based intermediation are the US and the UK (Bethlendi - Méró, 2020)

However, the late 1990s and early 2000s were characterized by a convergence of the two systems to the extent that the role of capital market-based intermediation developed faster than that of bank-based intermediation in traditionally bank-based countries. Nowadays, developed countries are characterized by both deep banking and market-based intermediation, but one or the other dominates, according to local traditions.

In this context, we will later review the depth of the financial intermediation system in the Central and Eastern European (CEE) countries up to 2019. To include 2020-21 in the analysis because of the COVID-19 pandemic would be technically incorrect since the pandemic one and a half to two years ago completely upset the trends and resulted in a temporary situation in funding (due to the stimulus packages of some states) that can hardly be permanently maintained.

Several studies analyzing the effectiveness of domestic venture capital investments and programmes. A significant number of these examine the role of the state and the steps to support the development of the startup ecosystem. Private or public operators or consortia of these may be involved in providing risk capital. In the early 2000s, it was necessary to complement private financing with public and EU funds, thus spreading the risks and increasing the volume of funds available. In our research, the preliminary assumption was that domestic startups cannot take their first steps in an environment rich in funding. Although there are programmes available with state and EU funding, it is questionable whether their volume is in line with the level of development of the domestic economy and the needs of the market. The availability of indicators that help determine the extent of the shortfall or surplus of resources will greatly help economic policymakers allocate the necessary resources. We found that many countries use different methodologies for aggregating venture capital investments. Therefore, in our analysis, the group of peer countries includes countries that are OECD members and have reported venture capital and private equity investments. The analysis is further complicated by the fact that venture capital or private equity is not included as a separate line in the MNB financial accounts statistics and, therefore, cannot be separated from the various other equity and non-listed equity groups. The data sources on venture capital and private equity investments in our research were partly Invest Europe and partly the Hungarian Venture Capital Association (MKME) reports. The data are the so-called “market sta-

tistics”, which refer to the financing obtained by Hungarian businesses from abroad or from within the country. The first step of our study was to review the related research and analyses.

## Literature review

In the 1990s, the literature identified and analyzed two distinct paths in the development of financial intermediation: bank-based and capital-market-based financial intermediation systems. Financial intermediation systems tend to be more market-based in higher-income countries where stock exchanges are more active and efficient than banks and shareholder rights are strongly protected (Demirguc-Kunt - Levine, 1999). Moreover, related research often suggests that systems with advanced financial markets are in some sense more advanced than bank-based systems (Allen - Gale, 1995).

The importance of the link between economic growth and the development of the financial system is stressed in several economic history analyses (Mérő, 2003). In their study, King and Levine used data from 80 countries between 1960 and 1989 to investigate whether there is a significant correlation between higher levels of financial intermediation and faster economic growth in that and subsequent periods. They used four indicators to assess the level of development of financial systems:

1. the size of the financial intermediation system relative to GDP,
2. the role of the banking sector and the central bank in financial intermediation,
3. the share of loans to private companies and the public sector, and
4. the size of loans to private companies as a share of GDP.

Growth is measured by the growth rate of real GDP per capita and the investment rate. In the period 1960-1989, all four financial system indicators showed positive and significant correlations with growth indicators. Furthermore, indicators of financial development are also highly correlated. In other words, the development of financial systems and economic growth are closely linked (King - Levine, 1993).

It is also important to note that, despite the different structures, the United States, England, Germany or Japan have similar living standards and growth rates over a long period. Thus, economic growth is not supported by bank-based intermediation or market-based intermediation but by both, and together, regardless of which type of intermediation is more dominant in the financial intermediation system of a country (Mérő, 2003). Hungarian SMEs are clearly not immune to the historical influence of financial culture (Tóth-Kása-Lentner, 2022).

The next step in our research was examining the mediation system in the CEE region and our country. The financial sector in the CEEC is significantly less developed than in the developed world. The starting point for the development of financial intermediation in Hungary, the Czech Republic and Poland was the financial system of a centrally planned economy, characterized by a single-tier banking system and the absence of a capital market. The literature analyzing the structural transforma-

tion of financial intermediation in these countries has hardly addressed the structural transformation of the financial intermediation system. Using the dichotomy of banking versus market intermediation, the region's countries were bank-based financial system countries in the early 2000s, while the development of both their banking systems and capital markets was far below the average level of even middle-income countries (Mérő, 2003).

Following the 2008 crisis, EU aid has sought to stimulate the economy not only through direct support but also through so-called financial instruments. In parallel to the decline in loans granted by banks on market terms, the provision of state-subsidized loans has increased in segments where the market used to play an active role in financing. As a result, the performance of state-supported financing instruments (microcredit, bank-subsidized loans, subsidized guarantees, and equity investments) has varied widely. According to the 2012 analysis, the Hungarian capital market was underdeveloped and dominated by large deals. The impact of public capital programmes on SME development has been small compared to other forms of support, despite the presence of several types of equity investment companies and the increasing amounts invested by them (Vörös, 2012).

## Financial intermediation system in the individual CEE states

All CEE members have a bank-based financial system, deeper banking, and weaker capital market intermediation and limited market-based banking, meaning that bank credit is the primary source of financing for non-financial firms in these countries, while capital markets play a much smaller role. However, even the relative importance of bank credit (as a share of GDP) is much lower than in comparable countries or the euro area average. As an illustration, Table 1 shows the data for the CEE and other countries in the different segments of financial intermediation.

**Table 1: Non-financial corporations' bond holdings (nominal value) as a percentage of GDP (2019)**

2019	Market-based loans	Bonds issued by financial institutions	Bonds of non-financial enterprises	Stock market capitalization*	Total
<b>Austria</b>	85,55	41,17	8,98	29,90	165,64
<b>Bulgaria</b>	49,74	1,13	2,60	23,29	76,79
<b>Czech Republic</b>	54,41	48,98	6,55	10,66	120,54
<b>Eurozone</b>	86,36	66,83	11,82	54,50	219,51
<b>France</b>	105,25	61,87	25,59	84,87	277,67
<b>Croatia</b>	50,64	0,37	4,14	36,97	92,19

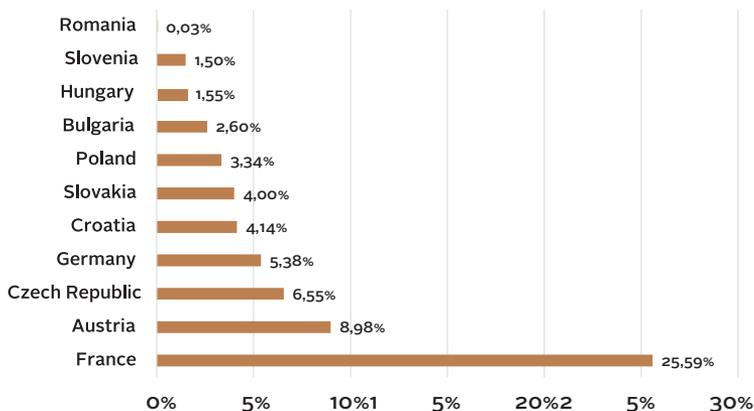
2019	Market-based loans	Bonds issued by financial institutions	Bonds of non-financial enterprises	Stock market capitalization*	Total
Poland	50,80	6,83	3,34	25,45	87,09
Hungary	33,37	5,90	1,55	20,12	60,94
Germany	79,72	40,42	5,38	54,34	179,87
Romania	24,72		0,03	10,44	
Slovakia	62,89	12,01	4,00	2,95	81,86
Slovenia	42,45	1,67	1,50	14,63	60,25

\*2018 data available for France and the euro area

Source of data: ECB, Eurostat, World Bank, BIS (2022)

The table shows the specificities of the countries. Hungary (together with Romania and Slovenia) can be considered significantly underdeveloped, even within the CEEC group. In Hungary, not only the depth of market-based lending but also the corporate bond market is very underdeveloped. This is illustrated in Figure 1.

**Figure 1: Non-financial corporations' bond holdings (nominal value) as a percentage of GDP (2019)**



Source of data: Eurostat (2022)

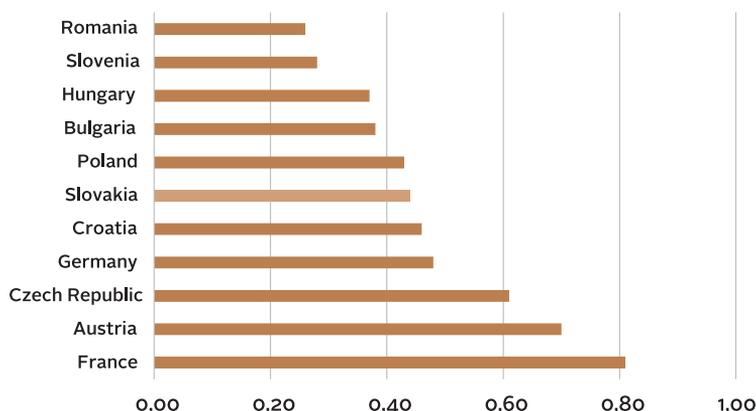
Bond issuance in the whole CEE region is more concentrated in banks, while its role in financing non-financial corporations is insignificant. This is, of course, not only a feature of the CEE but also of the euro area, but the former has a much lower share.

Stock market capitalization as a share of GDP is also relatively low and can be considered negligible below the mid-cap segment.

To put the financial development of the region in a broader perspective than the depth of financial intermediation, we can look at the IMF's Financial Development

Index, which measures the development of financial institutions and financial markets on a scale from 0 (least developed) to 1 (most developed), as a composite index. The financial institutions development index includes three items: the depth of financial intermediation through banks and institutional investors, access to services, and the efficiency of financial institutions. The financial markets index includes three similar but market-related items: depth of capital market-based intermediation, access to capital markets and market efficiency. The Financial Institutions and Financial Markets sub-indices are merged to create the Financial Development Index. Figure 2 shows the composite index for the countries analyzed.

**Figure 2: IMF Financial Development Index (2019)**



Source of data: IMF (2022)

The graph confirms that all CEE countries have a significantly less developed financial system than their EU counterparts. Hungary ranks in the middle, roughly between the Czech Republic and Poland in 2019. It can be concluded that the financial intermediation system in the CEE region is significantly less deep than in the West, and the Hungarian one is not particularly advanced even within the group of countries.

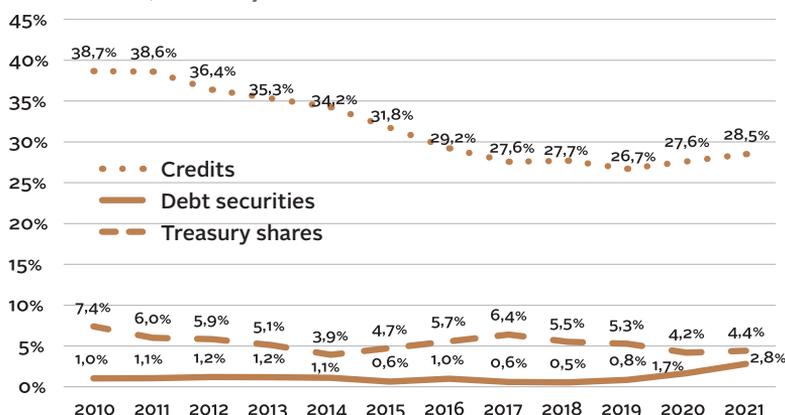
## The funding structure of hungarian non-financial enterprises

The financing of non-financial companies can be broken down into the following main elements:

1. Bank loans;
2. Capital market financing;
  - a. Corporate bond issuance;
  - b. Stock exchange share issue;
3. Venture capital or private equity financing.

Figure 3 shows the financing composition of non-financial corporations as a percentage of total assets (total liabilities) between 2010 and 2021. Unfortunately, venture capital or private equity is not included in the MNB financial accounts statistics as a separate item, and therefore cannot be separated from the various other equity and non-listed equity groups - so it will be dealt with separately below.

**Figure 3: Funding composition of non-financial corporations (as a percentage of total balance sheet, 2010-21)**



Source of data: MNB (2022).

The graph shows that the share of bank loans also declined significantly over the period until the launch of the MNB's Growth Loan Programme (NHP), which, however, cannot be considered a fully market source. Stock market shares have stagnated at around 4-5%, and their role is not significant. The role of corporate bonds was insignificant until 2019, at around 1%, but their share increased to 2.8% in 2020-21 thanks to government decisions and MNB programmes (Growth Bond Programme, GCP). However, this is still less than the proportion of shares listed on the stock exchange, and there is plenty of room for improvement. The study of bank financing of non-financial corporations is an exciting research topic in its own right, but it is beyond the scope of the present study, and it is not possible to separate venture capital stage companies from aggregate MNB data in the existing statistics.

As in the developed countries, governments in the CEE region have sought to alleviate difficulties in accessing capital through public intervention to promote economic growth and increase competitiveness. Between 2016 and 2020, the value of investment per firm in early-stage funded businesses in the CEE region was a third higher than in Europe at the start and end of the five years under review. However, the average amount of investment received by companies in the expansionary phase did not differ significantly, and in three of the five years studied, the share of growth deals was higher in the CEE region, while the share of growth deals in the region was significantly lower than in Europe as a whole (Karsai, 2022).

## Hungarian venture capital and private equity financing

After the regime change in Hungary, the private equity sector was the first to emerge in the Central and Eastern European region. Between 1989 and 2008, private equity investment in Hungary was predominantly provided by foreign, regional and global funds, while domestically based funds and sources played a negligible role in the market. The absence and relatively low weight of classical risk capital is due to the shortcomings and underdevelopment of both the demand and the supply side. The financing gap in the market resulted from an information or knowledge gap due to information asymmetry on the one hand, and a capital gap due to a supply-demand imbalance of capital on the other (Harding [2002], Nagy [2004], Szerb [2006]).

In Hungary, several government programmes have stimulated the provision of venture capital to innovative enterprises. However, these have failed to reach the target group of enterprises and have taken on a more subsidy character rather than an actual investment incentive (Karsai [2006]). There was a lack of investors with market experience who were able and willing to finance young and innovative companies and a lack of demand-side companies with the capacity and willingness to attract venture capital and high growth potential to attract investors to the sector under market conditions. A natural consequence of the information vacuum was that no capital was available for investment. Although a private equity market has emerged in Hungary, which can be considered well-developed compared to the region, the amount of funding available for young, innovative businesses has remained low, and a vibrant classical venture capital market has not really developed (Becsky-Nagy and Fazekas, 2017).

The use of EU grants as a financial instrument has led to a certain expansion of venture capital programmes. Thanks to the JEREMIE capital programme, most of the investments in 2010 were classic venture capital, financing startups and early-stage, pre-growth companies in biotechnology, medical instrumentation, computing and telecoms applications, industrial automation, among others (Red, 2012).

The data sources on venture capital and private equity investments in our research were partly Invest Europe and partly the Hungarian Venture Capital Association (MKME) reports. The data are the so-called “market statistics”, which refer to the financing obtained by Hungarian businesses from abroad or from within the country. In this section, we want to capture the current market situation and analyze the full year 2021. Note that compared to 2019, there has been no decline in this area in Hungary compared to other CEE countries. The first half of 2022 was still characterized by growth. Looking ahead, a downturn is already expected due to increased expectations of yields and tightening resources caused by economic-geopolitical problems.

**Table 2: Venture capital and private equity financing raised by Hungarian enterprises (2021)**

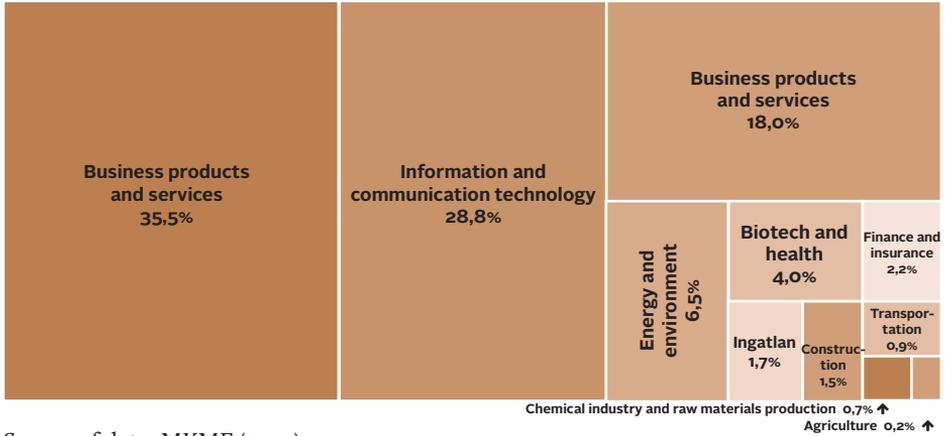
2021	Amount (thousand EUR)	Number of companies	Amount per company (thousands EUR)
<b>Agriculture</b>	418	3	139,3
<b>Business products and services</b>	40 482	37	1 094,1
<b>Chemical industry and raw materials production</b>	1 486	1	1 486,0
<b>Information and communication technology</b>	64 912	70	927,3
<b>Construction</b>	3 457	5	691,4
<b>Consumer goods and services</b>	79 953	70	1 142,2
<b>Energy and environment</b>	14 731	8	1 841,4
<b>Finance and insurance</b>	4 949	12	412,4
<b>Real estate</b>	3 921	3	1 307,0
<b>Biotech and health</b>	8 969	25	358,8
<b>Transportation</b>	2 029	7	289,9
<b>Total</b>	225 307	241	934,9

Source of data: MKME (2022)

In 2021, there were 241 transactions for a total value of €225.3 million, so the average transaction value was less than €1 million. The average transaction value ranges from €139,000 (agriculture) to €1.8 million (energy and environment). So Hungarian businesses do not do many transactions in terms of numbers, and the value of these is very low. The number of transactions and the total value were similar in 2020, although the value per transaction increased by around 5% (but still small).

Figure 4 shows the breakdown by sector, with consumer goods and services companies receiving the largest share of the total (35.5%), followed by the information and communication technology (ICT) industry (28.8%). The lowest investment was in agriculture (0.2%).

**Figure 4: Breakdown of total invested volume by sector (2021)**



Source of data: MKME (2022)

Another important issue in the industry is the raising (financing) of funds over a given period. Some of the funds raised are not yet invested in the period in question but rather indicate the amount of capital investment that can be expected in the near future. This is illustrated in Figure 5. The largest share comes from foundations (51%), followed by corporate investors (29%) and banks (13%). Geographically, 99% of resources came from the CEEC region. The role of public agencies is still small (3%), and the state’s involvement has decreased significantly compared to 2020 (in 2019/2020, a third of the resources came from public agencies). It is also very low because the average for the CEE region is much higher, close to 40%.

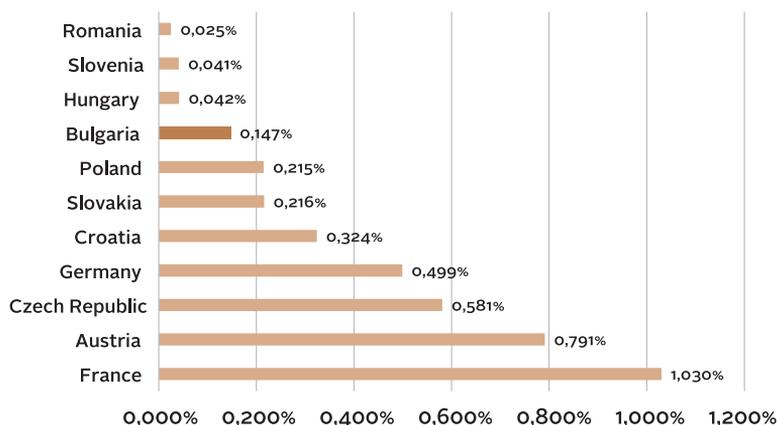
**Figure 5.: Breakdown of total invested volume by sector (2021)**



Source of data: MKME (2022)

An international summary is also available for private equity investment, shown in Figure 6 for the countries presented earlier. It is clear that Hungary is among the top performers in terms of investment as a share of GDP (0.147%), both in the CEE (average 0.228%) and at the EU level.

**Figure 6.: Private investment as a percentage of GDP (2021)**



Source of data: Invest Europe (2021a) and Invest Europe (2021b)

Overall, although the Hungarian venture capital and private equity market has developed a lot in recent years, it is still quite small. It operates with a low number of transactions (below 250 on the “market” side) and a very low average investment amount (below €1 million). According to the GEDI research conducted by Ács and colleagues (2017), the Hungarian entrepreneurial environment is the weakest in terms of the characteristics that determine entrepreneurial behaviour, such as the perception and assumption of business risks, the recognition of market opportunities, and the skills needed to create and lead startups.

Public involvement also seems insufficient for the time being. One of the most essential criteria for the success of public programmes is the extent to which they can contribute to the development of an institutional framework that allows for the emergence of a self-functioning market where market participants can operate the venture capital industry efficiently without state intervention (Becsky-Nagy-Fazekas, 2015). International experience also seems to confirm that public venture capital can improve the financed enterprises’ situation primarily through financial resources. However, its professional support is less effective compared to market-based venture capital (Becsky-Nagy - Fazekas, 2017). It can also be added that the private interest in hybrid (public and market) schemes has a positive impact on the efficiency of the funding model if “the schemes are designed with market-oriented regulation and in a form that mimics the operating mechanisms of independent market fund managers” (Fazekas-Becsky-Nagy, 2018).

We have already inferred the presence of a financing gap in the market from these data series, but we will also attempt to estimate its size.

## Funding gap analysis

The gap analysis of the Hungarian venture capital and private equity market was based on the OECD publication *Financing SMEs and Entrepreneurs 2022* and Invest Europe data. We used the so-called “market statistics”, i.e. data by the location (country) of the companies’ headquarters. The methodology is taken from the 2017 ex-ante analysis review prepared by Deloitte for MFB Zrt. (Deloitte, 2017)

The market gap is defined as the difference between the level of venture capital investment in Hungary as a percentage of GDP and the level of venture capital (VC) investment in Hungary. The level of risk capital investment corresponding to the GDP of Hungary was determined by regressing the risk capital investment of the CEE countries on their GDP as follows.

1. For 2014-2019, we examined venture capital investments in Hungary and CEE countries (OECD) as a percentage of GDP.
2. The years 2020-2021 are not included due to market-distorting government measures introduced due to the COVID-19 epidemic.
3. Their average value (2014-2018) has been projected onto the 2019 GDP at current prices.
4. We tested a linear regression between current GDP and VC investment level: we found a stronger than medium correlation (greater than 0.5) between the two data.
5. This was used to determine the size of the potential venture capital and private equity investment market that would correspond to Hungarian GDP based on the CCI data.

The following steps were carried out in the calculations:

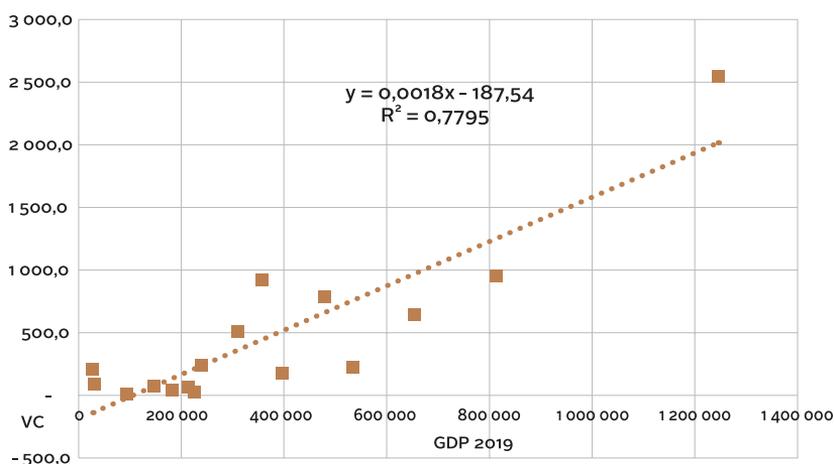
1. Based on OECD data available from 2014-2018, the correlation between GDP in 2019 and the average VC/GDP in 2014-2018 for the comparator countries was calculated (GDP in 2019 explained the VC/GDP ratio).
2. The regression relationship was used to estimate the level of risk capital investment in Hungary as a share of GDP.
3. The market gap is the difference between the level of venture capital investment in Hungary, which is equivalent to the level of GDP of Hungary, and the level of venture capital investment in Hungary. We note that in Hungary, public venture capital fund managers had significant activity in the 2017-2020 period, and private fund managers also managed public (and EU) funds. Therefore, our gap analysis looks at the additive gap over and above the already realized public market gap.

The group of comparator countries includes countries that are OECD members and have reported venture capital and private equity investments: the broadest group of European countries for which data is available, collected according to the same methodology.

These countries are: Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Latvia, the Netherlands, Poland, Portugal, Slovakia, Spain, Switzerland and the Netherlands. The UK, France and Italy have been removed from the list as outliers. The estimate for this country would be significantly distorted. Germany, Slovenia, and Lithuania, although OECD members, do not report venture capital and private equity as separate categories. Luxembourg and Sweden mean something, but not the whole, so they are also omitted. Bulgaria, Croatia, and Romania are not OECD members in the CEEC region.

The analysis was also performed on the average VC data from 2014-2018 and 2015-2018 according to the methodology above to check the robustness of the model. In both cases, we have a strong relationship.

**Figure 7: Model estimating the relationship between GDP and VC investment in 2019, based on average investment in 2014-2018 (data in millions of euros)**



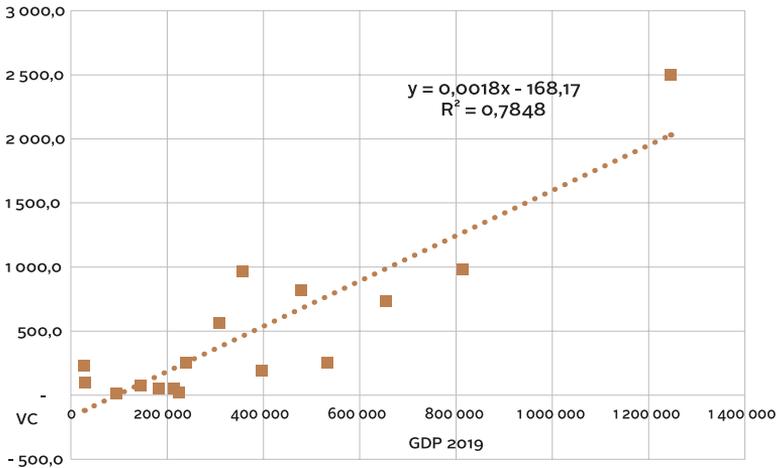
Source of data: OECD (2022)

In the first case, the Hungarian figure estimated by the model (inserting the 2019 Hungarian GDP at current prices into the equation) is EUR 75.5 million, which is roughly HUF 5.2 billion more per year than the actual figure, or EUR 12.5 million more per year at the MNB exchange rate<sup>3</sup> at the time of the analysis. This value can, therefore, be defined as the market gap.

<sup>3</sup> On 12/12/2022, the official MNB euro exchange rate was 417.81 forints.

Figure 8 shows the average VC investment scenario for 2015-2018. The model's coefficient of determination is also slightly higher, so the explanatory power is strong in this case.

**Figure 8: Model estimating the relationship between GDP and VC investment in 2019, based on average investment in 2015-2018 (data in millions of euros)**



Source of data: OECD (2022)

In the second case, the Hungarian figure estimated by the model (inserting the 2019 Hungarian GDP at current prices into the equation) is EUR 94.8 million, which is roughly HUF 13.2 billion per year at EUR 31.6 million per year, i.e. at the MNB exchange rate at the time of the analysis. In this model variation, this is the market niche, and the model is considered stable. If we take the two results as a kind of extreme value, we can conclude that the annual financing gap is between HUF 5.2 billion and HUF 13.2 billion. This gap represents an additional gap over and above the public capital programmes already implemented.

## Discussion: limitations of the analysis

The research findings are broadly in line with the literature: it is impossible to provide optimal support for startups from market sources alone in a financial intermediation system that has historically been bank-based.

The novelty of our analysis lies in the fact that there is no similar literature available in Hungary. As this is the first approach of its kind, there were obviously several limitations. The lack of available data and the absence of a uniform and equally based public and free data service has meant that several countries that would ideally have been included have been left out of the analysis. Achieving greater data transparency should be a priority for the regulatory and venture capital community in the period ahead.

The other difficulty was the outlier, off-trend or trend-breaking data from the coronavirus outbreak period, which we believe would not be professionally correct to use as it would significantly distort the conclusions that could be drawn. For this reason, we have stopped using them.

One limitation of the analysis is related to the methodology of linear regression. Although the data fit reasonably accurately (so no other methodology was needed at this level for the time being), it is not certain that the same methodology would work in the same way on a longer data series. In a future study, other estimation methods will probably be worthwhile to approach the question. The issue of causality, i.e. the factors influencing the size of the financing gap, will be a particularly interesting line of research.

Furthermore, a deeper examination of bank financing of non-financial corporations would be beyond the scope of the current study but should also be explored. In the present case, it was impossible because it is impossible to separate venture capital stage companies from aggregate data in the existing statistics. Creating a separate MNB statistical data table for startups in the banking data series

## Conclusions

The main findings of our research are in line with previous literature. Overall, the traditionally bank-based Hungarian financial intermediation system continues to lag behind even most CEE countries in all segments of capital market financing. The venture capital and private equity markets have relatively few transactions and even those with very low average investments of less than €1 million. The role of the state in financing is below the average for the CEECs.

Despite existing public efforts, the funding gap in the Hungarian venture capital market is still significant. The main novelty of our study is that we attempted to provide a numerical estimate of the magnitude of the gap. Despite the limitations of the research and methodology (lack of data, data quality, etc.), our estimation based on linear regression revealed a strong relationship between venture capital investment and current price GDP.

The difference between the estimated potential venture capital investment stock and the annual averages  $z_{realized}$  clearly shows the market gap, which, depending on the boundary conditions of the model, could range between EUR 12.5-31.6 million, i.e. HUF 5.2-13.2 billion per year at the time of the analysis. Moreover, this gap already represents an additional gap over and above the public programmes implemented.

The presence of the state in countries with a historically more bank-based financial intermediation system is certainly justified, as market-based financing alone cannot create an optimal environment for startups. Based on our analysis, even an increase in the state presence seems justifiable (at least worth exploring).

One of the challenges for regulators in the future must be to create greater transparency in the interests of both the authorities and the venture capital community. In research, having this would allow us to build more accurate models and explore the causality as well. ■

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