

## A R A Ş T I R M A M A K A L E S İ / R E S E A R C H A R T I C L E

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THE ROLE OF GOVERNMENT IN ENTREPRENEURIAL FINANCE:  
VENTURE CAPITAL INVESTING AND INNOVATION

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## ABSTRACT

The use of venture capital has been discussed extensively in recent years as an alternative source of funding for start-ups to meet their financial needs. The contribution of venture capitalists to the overall business development of companies has been highlighted in this debate. This paper presents a research framework to identify the innovation indicators in terms of the role of government in their creation that influence venture capital investment. The relationship between innovation as measured by ease of business creation, ease of resolving insolvency, current expenditure on education, ICT (information and communication technology) use, ease of getting credit, domestic financial resources to private sector, protection of minority investors, knowledge-intensive employment, exports of creative goods, domestic patent applications and venture capital investment is examined for OECD countries over ten-year period between 2012 and 2021. The results show that the main determinants of innovation that affect venture capital investment are ease of insolvency procedures, ease of access to credit, current expenditure on education, use of ICT, knowledge-intensive employment, exports of creative goods and GDP per capita.

**Anahtar Kelimeler:** Venture Capital Investments, Innovation, OECD Economies

**Keywords:** G24, O30, O38

GİRİŞİMCİLİK FİNANSMANINDA DEVLETİN ROLÜ: GİRİŞİM SERMAYESİ  
YATIRIMLARI VE İNOVASYON

## ÖZET

Bu çalışma, risk sermayesi yatırımlarını etkileyen devlet destekli inovasyon değişkenlerini belirlemek için bir araştırma çerçevesi sunmaktadır. İş kurma kolaylığı, iflastan kurtulma kolaylığı, eğitime yönelik cari harcamalar, BİT (bilgi ve iletişim teknolojisi) kullanımı, kredi alma kolaylığı, özel sektöre sağlanan yerel mali kaynaklar, azınlık yatırımcılarının korunması, bilgi yoğun istihdam, yaratıcı ürün ihracatı, yerli patent başvuruları ve risk sermayesi arasındaki ilişki OECD ülkeleri için on yıllık bir süre olan 2012-2021 dönemi arasında incelenmiştir. Bulgular risk sermayesi yatırımlarını etkileyen temel inovasyon belirleyicilerinin iflastan kurtulma kolaylığı, kredi alma kolaylığı, cari eğitim harcamaları, BİT kullanımı, bilgi yoğun istihdam, yaratıcı ürünlerin ihracatı ve kişi başına düşen GSMH olduğunu göstermektedir.

**Anahtar Kelimeler:** Risk Sermayesi, İnovasyon, OECD Ülkeleri

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## INTRODUCTION

Small and medium-sized enterprises (SMEs) have a very crucial role in today's economies. Considering that 90 per cent of all companies worldwide are SMEs, as stated by the World Bank, the importance of SMEs for the global economy becomes even clearer. The contribution of these companies to production, employment, exports, innovation and thus economic growth is very high. In Germany, for example, SMEs provide more than half of all jobs and make an important contribution to the economy, approximately 35% of all company turnover in Germany is generated by SMEs (BMW, 2019).

Access to new sources of finance is crucial for supporting SMEs in both developed and emerging economies. The key to fostering strong economies is investment sustainability, which is closely linked to access to finance. Although SMEs are the backbone of the global economy, access to finance is much more difficult for them than for large companies. The problems created by the COVID-19 pandemic and macroeconomic instability around the world have made SMEs' access to finance more difficult. Many SMEs, established with limited capital, finance themselves primarily through the banking sector. However, SMEs have also been affected by the credit crunch in the banking sector triggered by the global health crisis. According to the report by PwC (2020), banks have experienced difficulties in obtaining loans due to the loss of confidence caused by the crisis and a decline in their revenues due to the decrease in the volume of transactions. The changes in customer needs, consumption habits and customer behavior that accompanied the COVID 19 crisis made it necessary for banks to classify and analyze their customers into groups according to various criteria and to diversify their service areas in line with changing customer habits. Faced with the healthcare crisis and economic uncertainties, SMEs that have been unable to obtain sufficient funding from banks have sought other sources of financing to survive and gain competitive advantage. Traditional financing methods such as bank loans, government incentives and support are not sufficient to meet the financing needs of SMEs and new entrepreneurs who want to start a business. While SMEs are using the not-so-old sources of funding such as venture capital and angel investors to raise capital and promote sustainability and growth, even these sources are not sufficient to fund SMEs. The global process of change associated with digitalization has affected many areas of life, including the financial sector, and led to the emergence of new generation forms of financing. Entrepreneurs who could not benefit from the traditional types of financing, i.e. debt and equity financing, tried to reach out to the masses who would grant them financing by explaining their ideas and projects through digital platforms. This innovative approach, implemented through digital platforms, was indeed successful and new generation financing methods emerged. The emergence of "new" funding sources such as crowdfunding and initial coin offerings, on the other hand, has opened up the possibility of looking at the challenges faced by entrepreneurial companies from a different perspective. These new sources of financing also have many advantages over traditional financing methods. They stand out from traditional methods mainly because of the number of people they are able to get in touch with, their fastness and their expense. But even with these advantages, security gaps and regulatory issues are the main weaknesses of these new sources of funding.

Venture capital continues to be an important financing channel for small and medium-sized enterprises. According to the EY (2023) report, VC-funded companies raised \$44.1 billion in the first quarter of 2023, 37% more than in the fourth quarter of 2022 (\$32.3 billion), with two large deals of \$16.5 billion highlighting this. Meanwhile, the recent bank failures have dampened the overall outlook for venture capital investment, forcing VCs and start-ups to re-evaluate their options. They note that entrepreneurs need to plan for the long term and focus on fundamentals, including profitability, cash flow and funding, to prepare for better conditions.

In recent years, there has been much discussion about the potential role of venture capital in providing an additional source of funding for start-ups to meet the financing needs of new businesses, and venture capital investments are seen as suitable for investments that are more creatively oriented. This discussion highlights the role of venture capitalists in the development and positive financial performance of enterprises. This study seeks to investigate the link between venture capital investment and innovation in terms of the role of the state in its emergence. The relationship between innovation as measured by the facilitation of business start-ups, the facilitation of insolvency procedures, current expenditure on education, the use of ICT, the

facilitation of borrowing and domestic financing of the private sector, ease of protecting minority investors, knowledge-intensive employment, creative goods exports, domestic resident patent applications and venture capital investment is examined for the OECD countries with a panel data analysis for the period between 2012 and 2021. It is found that there is a relation between ease of resolving insolvency, ease of getting credit, current expenditure on education, ICT use, knowledge-intensive employment, creative goods exports, GDP per capita and venture capital investments in total and venture capital investments in the start-up phase.

The following section provides a literature review on the link between innovation and venture capital financing. Then the data, the variables and the model used are presented. Section 4 contains a documentation of the results. The last section summarises the results and includes a discussion, concluding remarks and recommendations for further research.

## 1. Literature Review

When people or small businesses have an innovative idea that either makes a lot of money or fails completely, banks are unlikely to lend for it for fear of losing the money. With such an idea, the better option is to turn to a venture capitalist. Venture capitalists provide financing for so-called disruptive companies whose chances of success are not so easy to estimate. The OECD defines venture capital as a special form of equity financing for companies that are typically young, have a high risk profile and are often high-tech, and notes that implementing reforms to balance increased corporate transparency and investor protection to promote innovative investments and businesses is an essential part of any comprehensive growth strategy (OECD, 2001).

The link between venture capital investment and innovation is highly contested in the literature, as it is assumed that the relationship is two-sided, i.e. that the level of venture capital investment increases with innovation, while on the other hand venture capital investment is required for innovation to take place. However, most studies have shown that venture capital investment does not necessarily lead to innovation; they suggest that innovation encourages venture capital investment, but not vice versa (Caselli, Gatti and Perrini, 2008, Stuck and Weingarten, 2005). There are also studies that have not found a clear result on this topic. Timell (2013), for example, analyses the Swedish venture capital industry and finds a correlation between innovation and venture capital. However, it is not clear from his research whether venture capital drives innovation or existing innovative firms attract venture capital.

The effect of venture capital investments on innovation and growth of early-stage firms in Germany is examined by Engel and Keilbach (2007). They found that companies with venture capital funding apply for more patents. However, these were already acquired before the venture capitalists invested, allowing them to select firms with a proven innovation performance. After the investment, the total number of patents of the companies no longer differs significantly, but their growth rates do. This shows that the stronger invention performance of venture capital-financed companies is more due to the selection process of the venture capitalist before the financing than to the venture capital financing itself.

In their study, Kortum and Lerner (2000) examine the impact of venture capital on patentable inventions in the United States and conclude that a higher proportion of venture capital is associated with significantly higher patenting rates. In a similar study, Geronikolaou and Papachristou (2008) look for the causal link between venture capital and innovation in the form of patents in Europe. They test whether there is causality from patents to venture capital by estimating a linear dynamic panel model, and causality from venture capital to patents by estimating a panel count model. The empirical results show that the path of causality is from patents to venture capital, suggesting that in Europe innovation seems to generate a need for venture capital, rather than venture capital generating a source of innovation. In their analysis, Hall and Lerner (2009) come to the conclusion that small and start-up innovative enterprises have a large cost of capital, which is only slightly reduced through the availability of venture capital. Large companies, on the other hand, seem to prefer to finance initiatives with internal resources while controlling their cash flow. They find that venture capital therefore seems to play only a limited role in closing the funding gap, especially in countries with underdeveloped public equity markets for VC exits. Sahaym, Steensma and Barden (2010) examine how R&D affects the use of venture capital by companies and discuss the differences in this context between different industries. They find that R&D investment generally increases the amount of venture capital

funding in an industry. They also find that R&D investment has a particularly strong impact on the use of venture capital by firms in industries that are growing rapidly and undergoing technological change. Khan, Qu, Wei and Wang (2021) analyse 41 countries based on their venture capital funding from 2006 to 2016 and find a strong significant relationship between venture capital investment and patent applications. In summary, their results suggest that venture capital investment increases significantly with innovation activity. According to the authors, these findings suggest that governments and policy makers should be encouraged to support venture capital investments that provide start-ups with an alternative source of funding when it is difficult for them to raise money from other sources. This shows that policy makers need to consider the impact of venture capital on the economy in order to foster innovation. Ni, Luan, Cao and Finlay (2014) examine the Chinese market in their study to find out whether and to what extent venture capital has an impact on innovation and whether innovation is promoted by venture capital or vice versa. The number of patents and the corresponding productivity growth are used to measure innovation. The empirical results of their analyses show that venture capital has a small but positive impact on innovation in the Chinese market. They also find that firms' ability to expand can also be an important determinant of innovation and especially productivity growth. Therefore, to shed light on the fundamental process of venture capital in promoting innovation in the Chinese market, they suggest a number of potentially contributing factors. Chang and Astorsdotter (2021) investigate how different types of venture capital affect innovation in Swedish firms. Using 440 venture-funded firms, they examine the impact of venture capital from the public sector, venture capital from the private sector and mixed venture capital, a combination of both public and private venture capital, on four innovation-related factors, namely patent grants, passive citations, trademarks and intellectual property rights. The results show that all types of venture capital have a positive impact on innovation, with mixed venture capital having the strongest effect. While private venture capital drives innovation mainly through trademarks, public venture capital increases the quality of both trademarks and patents. They also point out that public venture capital tends to concentrate more on the quality of innovation and private venture capital more on the commercialisation of innovations and their market introduction. In another study, Leogrande, Costantiello and Laureti (2021) examine the relationship between venture capital spending and innovation in Europe for 36 countries between 2010 and 2019. Their results show that the level of venture capital spending is positively associated with the number of foreign PhDs and the innovation index and negatively associated with government sourcing of high-tech products, innovators, exports of medium- and high-tech products and public-private co-publications.

Most of the studies conducted so far have attempted to examine the relationship between venture capital and innovation, focusing on large venture capital investments rather than small and medium-sized enterprises. Moreover, the topic has mostly been examined in the context of patent applications as a proxy measure for innovation. As the literature review shows, most studies to date demonstrate the positive contribution of venture capital to innovation.

## 2. Data and Methodology

The data sources used were the publicly available data of the OECD and the Global Innovation Index (GII). As data availability varies widely between countries, it was decided to use the information for the economies shown in the table below.

**Table 1.** Countries analysed

	<b>Country</b>		<b>Country</b>
1	Austria	13	Ireland
2	Australia	14	Israel
3	Belgium	15	Italy
4	Canada	16	Portugal
5	Czech Republic	17	Slovak Republic
6	Denmark	18	Slovenia
7	Estonia	19	Spain
8	Finland	20	Sweden
9	France	21	Switzerland
10	Germany	22	United Kingdom
11	Greece	23	United States
12	Hungary		

The observation period is 2012 - 2021, i.e. the entire panel for OECD economies contains 230 observations in 23 groups. The Table 2 provides a detailed description of the indicators included, as contained in the descriptions and their abbreviations.

**Table 2. Variables**

Indicator	Indicator Description	Abbreviations
Total venture capital investments - (seed, start-up and other early stage and late stage investments) (Dependent variable)	The sum of venture capital investments (including seed, start-up and other early- and late-stage investments) (in US dollars and as a share of GDP).	TVC
Early-stage venture capital investments - (start-up and other early-stage investments) (Dependent variable)	The sum of start-up and other early-stage venture capital investments (in US dollars and as a share of GDP).	ESCV
Ease of starting a business	Economies ranked by the ease of starting a business (time taken to complete procedures and minimum paid-up capital, ease of obtaining all necessary permits and completing all necessary filings).	ESB
Ease of resolving insolvency	The ranking of economies according to the ease of resolving insolvencies ( the recovery rate, through reorganization, liquidation or debt enforcement proceedings).	ERI
Current expenditure on education, % of GDP	Government spending on education ( government expenditure on education expressed as a percentage of GDP).	CEE
ICT use	The ICT usage index is a composite index that takes into account three ICT variables, each weighted at 33%: the share of internet users, the number of active fixed broadband connections per 100 people and the number of active mobile broadband connections per 100 people.	ICTU
Ease of getting credit	Measure the coverage and accessibility of credit registries.	EGC
Domestic financial resources to private sector, % GDP	Financial resources made available to the private sector, e.g. in the form of loans, purchases of non-equity securities, trade credits and other claims that give rise to a repayment claim. In some countries, these claims also include loans to public enterprises.	DFRS
Ease of protecting minority investors	The extent of conflict of interest regulation and the index for the extent of shareholder governance (corporate transparency).	EPI
Knowledge-intensive employment	Sum of employees in management, professionals, technicians and associated professionals as a percentage of total employees.	KIE
Creative goods exports, % of total trade	Creative goods exports ( creative goods total exports as a share of total trade).	CGE
Domestic resident patent app./bn PPP\$ GDP	The number of local patent applications filed at a particular national or regional patent office.	DRPA
GDP per capita (Control Variable)	GDP per capita, PPP\$.	GDP

**Sources:** OECD, GII

The dependent variables, i.e. total venture capital investments and venture capital for start-up and early-stage investments, show that venture capital investments in OECD companies have been increasing. The comparison between 2012 and 2021 demonstrates this increase very clearly, as illustrated in Table 3 below. The strongest increase is seen in Denmark and Israel. On the other hand, most start-up and early-stage venture capital investments were made in Canada, France and

Denmark. Furthermore, in Denmark and Israel most venture capital investments are used for start-ups or early-stage companies.

**Table 3.** The Venture Capital Investments of Several Countries

Total Venture Capital Investments (US Dollar, Millions)				Early stage Venture Capital Investments (US Dollar, Millions)				
Country	2012	2021	% of change	2012	2021	% of change	% in Total Venture Capital in 2012	% in Total Venture Capital in 2021
Canada	1.406.973	8.836.692	528	413.023	4.328.103	947	29	48
Denmark	100.230	959.393	857	62.174	530.899	753	62	55
Finland	103.488	948.451	816	78.887	155.495	97	76	16
France	609.866	3.577.843	486	78.313	963.010	1129	12	26
Germany	734.427	4.691.641	538	422.357	1.610.529	281	57	34
Israel	867.000	8.387.195	867	695.000	5.183.195	645	80	61
Spain	268.635	1.576.393	486	140.572	497.171	253	52	31
Sweden	288.430	1.086.085	276	130.372	306.453	135	45	28
Switzerland	193.509	735.159	279	58.295	348.648	498	30	47
United Kingdom	944.485	5.176.394	448	575.714	1.928.288	234	60	37
United States	39.675.845	135.648.691	241	13.714.834	46.153.055	236	34	34

**Sources:** OECD

The data for the independent variables come from the Global Innovation Index, which gives key indicators of performance and ranks 132 economies according to their innovation systems. The index is built on an extensive dataset of 81 measures taken from global public and private sources (GII, 2022). Table 4 contains the hypotheses developed and the expected effects of the independent variables on venture capital investments.

**Table 4.** Developed Hypotheses

Indicator	Hypotheses	Expected Impact
ESB	There is a linear relationship between the ease of starting a business and innovation, and this relationship has an impact on venture capital investment.	(+)
ERI	There is a linear relationship between the ease of resolving insolvency and innovation, and this relationship has an impact on venture capital investment.	(+)
CEE	There is a linear relationship between the current expenditure on education and innovation, and this relationship has an impact on venture capital investment.	(+)
ICTU	There is a linear relationship between the ICT use and innovation, and this relationship has an impact on venture capital investment.	(+)
EGC	There is a linear relationship between the ease of getting credit and innovation, and this relationship has an impact on venture capital investment.	(+)
DFRS	There is a linear relationship between the domestic financial resources to private sector and innovation, and this relationship has an impact on venture capital investment.	(+)
EPI	There is a linear relationship between the ease of protecting minority investors and innovation, and this relationship has an impact on venture capital investment.	(+)
KIE	There is a linear relationship between the knowledge-intensive employment and innovation, and this relationship has an impact on venture capital investment.	(+)
CGE	There is a linear relationship between creative goods exports and innovation, and this relationship has an impact on venture capital investment.	(+)
DRPA	There is a linear relationship between the domestic resident patent app. and innovation, and this relationship has an impact on venture capital investment.	(+)
GDP	There is a linear relationship between GDP per capita and innovation, and this relationship has an impact on venture capital investment.	(+)

In order to test the degree of stationarity of the variables, the Levin-Lin-Chu test was used. On the other hand, Breusch-Godfrey-Pagan tests were applied to check for the presence of heteroskedasticity problems. Since the data collected have the same cross-sectional units (countries) collected over time, the panel data method is used for the analysis and accordingly the following models were developed to test the hypothesis;

$$(1) TVC_{it} = \beta_0 + \beta_1ESB_{it} + \beta_2ERI_{it} + \beta_3CEE_{it} + \beta_4ICTU_{it} + \beta_5EGC_{it} + \beta_6DFRS_{it} + \beta_7EPI_{it} + \beta_8KIE_{it} + \beta_9CGE_{it} + \beta_{10}DRPA_{it} + \beta_{11}GDP_{it} + \varepsilon_{it}$$

$$(2) ESVC_{it} = \beta_0 + \beta_1ESB_{it} + \beta_2ERI_{it} + \beta_3CEE_{it} + \beta_4ICTU_{it} + \beta_5EGC_{it} + \beta_6DFRS_{it} + \beta_7EPI_{it} + \beta_8KIE_{it} + \beta_9CGE_{it} + \beta_{10}DRPA_{it} + \beta_{11}GDP_{it} + \varepsilon_{it}$$

### 3. Results

Before estimating the model, the stationarity of the time series is tested. The results of the unit root test, shown below in Table 5, indicate the presence of a unit root for the dependent variables total venture capital investment and early stage venture capital investment. The Levin-Lin-Chu test has a corresponding p-value of more than 0.1, which means that the series is not stationary. For these two variables, the first difference of the variables is used and the resulting series is found to be stationary.

**Table 5.** Results of Levin-Lin-Chu for All Variables

Variable	Statistic	p-Value	Statistic (first difference)	p-Value (first difference)
Total Venture Capital Investments	-0.5597	0.2878*	-6.4819	0.0000
Early stage Venture Capital Investments	-0.8264	0.2043*	-8.5420	0.0000
Ease of starting a business	-14.4061	0.0000	-	-
Ease of resolving insolvency	-15.9399	0.0000	-	-
Current expenditure on education	-6.2e+02	0.0000	-	-
ICT use	-17.2216	0.0000	-	-
Ease of getting credit	-20.3064	0.0000	-	-
Domestic financial resources to private sector	-5.1392	0.0000	-	-
Ease of protecting minority investors	-6.9244	0.0000	-	-
Knowledge-intensive employment	-51.8816	0.0000	-	-
Creative goods exports	-18.7272	0.0000	-	-
Domestic resident patent app	-12.8596	0.0000	-	-
GDP per capita	-3.0322	0.0012	-	-

\*Null hypothesis: Panels contain unit roots

The Pearson correlation coefficients between all variables are shown in Table 6 below. Multicollinearity is considered a serious problem when the correlation coefficient between two variables is above a reference value of 0.8 in two directions (Gujarati, Porter and Gunasekar, 2017). The evaluation of the correlation coefficients shows that the models used are free from the problem of multicollinearity. The models are also tested for heteroskedasticity. Breusch-Pagan tests are also conducted to determine whether heteroskedasticity exists in the overall models. According to the results, it was found that the variances of the error terms in both models are subject to variation, i.e. there is a heteroskedasticity problem. This heteroskedasticity problem is corrected by using robust standard errors. According to the outcome of the Hausman test, panel data with random effect are used to estimate the models.

**Table 6.** Pearson Correlation

	TVC	ESVC	ESB	ERI	CEE	ICTU	EGC	DFRS	EPI	KIE	CGE	DRPA	GDP
TVC	1.00												
ESVC	0.46	1.00											
ESB	-0.07	-0.04	1.00										
ERI	-0.06	-0.03	0.13	1.00									
CEE	-0.01	-0.04	0.33	0.41	1.00								
ICTU	0.06	0.06	0.26	0.37	0.41	1.00							
EGC	0.02	-0.03	0.04	0.18	0.07	0.16	1.00						
DFRS	-0.07	-0.07	0.12	0.28	0.36	0.21	0.33	1.00					
EPI	-0.02	-0.01	0.44	0.41	0.23	0.21	0.08	0.14	1.00				
KIE	-0.05	-0.01	0.34	0.30	0.48	0.68	0.15	0.18	0.21	1.00			
CGE	0.13	0.13	-0.44	-0.29	-0.31	-0.27	0.13	-0.30	-0.37	-0.28	1.00		
DRPA	-0.01	0.04	-0.17	0.34	0.35	0.40	0.14	0.38	-0.06	0.36	-0.15	1.00	
GDP	0.02	0.05	0.15	0.52	0.27	0.70	0.29	0.32	0.30	0.61	-0.29	0.51	1.00

Table 7 below shows the results of the GLS random effects regression for both models. The test results show that there is a strong relationship between venture capital and innovation variables.

**Table 7.** Regression Results

Random-effects GLS regression		Random-effects GLS regression	
Dependent Variable : TVC		Dependent Variable : ESVC	
Variables	Estimated Coefficients (standard errors)	Variables	Estimated Coefficients (standard errors)
ESB	-.0041015 (.0035317)	ESB	.0034911 (.0032733)
ERI	-.0027766** (.0011563)	ERI	-.0013323 (.0010099)
CEE	.0319813** (.0170755)	CEE	-.0026068 (.015502)
ICTU	.0043916** (.0018631)	ICTU	.0022056* (.0012234)
EGC	.0003699 (.0009037)	EGC	-.0015298* (.000807)
DFRS	-.0004881 (.0003596)	DFRS	-.0002729 (.0003221)
EPI	.001172 (.0010741)	EPI	.0010261 (.0013703)
KIE	-.0089577*** (.0032338)	KIE	-.0049144* (.0025954)
CGE	.0125027 *** (.0034297)	CGE	.0199775** (.0095486)
DRPA	-.0026854 (.0028484)	DRPA	.0041644 (.0029896)
GDP	.3130763 * (.1804204)	GDP	.2913915 * (.1582319)
constant	-.9409977 (.8415265)	constant	-1.43267 (.6666713)
Number of observations: 207		Number of observations: 207	
Number of groups: 23		Number of groups: 23	
Wald chi2(9): 136.04		Wald chi2(9): 29.85	
Prob > chi2: 0.0000		Prob > chi2: 0.0017	
R-squared between: 0.4291		R-squared between: 0.2246	
Breusch-Pagan: 0.0000		Breusch-Pagan: 0.0004	
Hausman Prob>chi2: 0.7135		Hausman Prob>chi2: 0.2988	
Legend: * p<0.10 ** p<0.05 ***p<0.01			

The results show that the ease of resolving insolvency, current expenditure on education as a % of GDP, ICT usage, knowledge intensive employment, creative goods exports as a % total trade and GDP per capita are significant. The assumed positive impact of current expenditure on



education, ICT use, creative goods exports and GDP per capita on total venture capital investment is found to be statistically valid, which in turn is supported by the negative and significant coefficient on the explanatory variables of ease of resolving insolvency and knowledge-intensive employment. The increase in current expenditure on education, ICT use, exports of creative goods and GDP per capita leads to a positive and significant increase in the variable of total investment in venture capital. Conversely, an increase in the ease of insolvency proceedings and knowledge-intensive employment leads to a decrease in total investment in venture capital. For the second model, ICT usage, ease of getting credit, knowledge intensive employment, creative goods exports as a % total trade and GDP per capita are significant. A positive impact of ICT use, creative goods exports and GDP per capita on early-stage venture capital investment and a negative impact of ease of getting credit and knowledge-intensive employment are found to be statistically valid. An increase in ICT use, creative goods exports and GDP per capita results in a positive and significant rise in the early-stage venture capital investment indicator. On the other hand, an increase in ease of getting credit and in knowledge-intensive employment results in a decrease in early-stage venture capital investment.

## CONCLUSION AND DISCUSSION

This study attempts to provide additional insight into the discussions on venture capital investment and innovation in terms of the role of the government in its creation. The amount of venture capital investment and the innovation indicators were found to be correlated, as predicted.

The results of the first model suggest that as education spending increases, innovation is likely to increase, which will increase the need for venture capital investment. It is well known that every innovation that emerged required people to adapt to it, in other words, to learn something new. Innovation and education are important interdependent factors. Innovation increases as the level of education rises. On the other hand, as innovation progresses, so does the demand for learning. Improving access and quality of education has significant potential to promote entrepreneurship and innovation (Biasi, Deming and Moser, 2021), which also raises the requirement to invest in venture capital. The other proxy, information and communication technology, which is a driver of innovation (Spiezia, 2011), was also found to have a positive significant effect on innovation, leading to higher venture capital investment. Innovation forces firms into being more creative by encouraging them to experiment with the creation of new processes, services and products, leading to the generation with new ways of doing business that help firms to grow and improve their competitiveness. Therefore, it can be said that ICT is a crucial component in promoting innovation. According to Pesole (2015), across Europe, ICT contributes to 26% of technological innovation, 19% of skills adoption, 25% of competitiveness in knowledge-based goods, 20% of competitiveness in knowledge-based services and 23% of innovative business dynamism. In particular, information and communication technologies are now highly essential to contribute to innovation through digital learning in higher education. Furthermore, it is observed that the increase in the share of creative goods in total exports indicates a high level of innovation, which heightens the demand for venture capital investment. With the increase in GDP per capita also comes an increase in innovation, and this increase leads to an increase in venture capital investment.

On the other hand, contrary to expectations, innovation increases when the rate of recovery through reorganisation, liquidation or enforcement procedures increases, but this difficult procedure reduces the level of venture capital investment. Unlike expected, it is found that easing insolvency procedures also discourages venture capitalists from making risky loans to small and medium-sized enterprises that generate innovation. The reason for this could be that venture capitalists do not trust the process, even if creditors get back a larger part of their investments in facilitated insolvency proceedings. The other proxy, knowledge-intensive employment, also had an unexpected effect on venture capital investment. It is assumed that a higher share of managers, professionals, technical employees and associates in total employment promotes innovation and that firms have a higher demand to obtain loans from venture capitalists. However, it is found that while knowledge-intensive employment leads to more innovation, it also causes a decrease in venture capital investment. Since venture capitalists are assumed to provide both capital and

knowledge to firms, the more knowledge-intensive employment there is, the less they might invest in firms. The second model shows, in addition to the results above, that easier access to credit leads to more innovation and a decrease in early-stage venture capital investment. This shows that when credit conditions are eased, small and medium-sized enterprises generally prefer bank loans or other financing methods rather than venture capital to generate innovations.

As a conclusion it could be said that venture capital is the driving force behind small and medium-sized enterprises and entrepreneurship. It enables innovation and allows the financing of business ideas that would otherwise have little chance of obtaining the necessary capital. It thus creates the basis for success in the international competition thus for future economic growth. It has been accused that venture capital firms are interested mainly in taking companies public and earning money through the IPO instead of focusing on the long-term value of the company. Therefore, there should be increased levels of confidentiality and transparency of venture capital companies. Innovation will be better promoted in this way than through pure financial support.

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**EXTENDED ABSTRACT**  
**GENİŞLETİLMİŞ ÖZET****GİRİŞİMCİLİK FİNANSMANINDA DEVLETİN ROLÜ: GİRİŞİM SERMAYESİ  
YATIRIMLARI VE İNOVASYON**

Finansman kaynaklarına erişim, hem gelişmiş hem de gelişmekte olan ekonomilerdeki küçük ve orta ölçekli işletmelerin (KOBİ) desteklenmesi açısından hayati öneme sahiptir. Güçlü ekonomileri teşvik etmenin anahtarı, finansmana erişimle yakından bağlantılı olan yatırım sürdürülebilirliğidir. KOBİ'ler küresel ekonominin omurgasını oluştursa da finansmana erişim onlar için büyük şirketlere göre çok daha zordur. Dünya genelinde yaşanan COVID-19 salgınının yarattığı sorunlar ve makroekonomik istikrarsızlıklar KOBİ'lerin finansmana erişimini daha fazla zorlaştırmıştır. Sınırlı sermaye ile kurulan birçok KOBİ, kendilerini öncelikle bankacılık sektörü aracılığıyla finanse etmektedir. Ancak küresel sağlık krizinin bankacılık sektöründe tetiklediği kredi sıkışıklığından KOBİ'ler de etkilenmiştir. PwC (2020) tarafından hazırlanan rapora göre bankalar, krizin yarattığı güven kaybı ve işlem hacminin azalması nedeniyle kredi temininde zorluklar yaşamışlardır. COVID 19 kriziyle birlikte müşteri ihtiyaçları, tüketim alışkanlıkları ve müşteri davranışlarında yaşanan değişiklikler, bankaların müşterilerini çeşitli kriterlere göre gruplara ayırarak analiz etmelerini ve değişen müşteri alışkanlıkları doğrultusunda hizmet alanlarını çeşitlendirmelerini zorunlu hale getirmiştir. Sağlık krizi ve ekonomik belirsizliklerle karşı karşıya kalan, bankalardan yeterli finansman sağlayamayan KOBİ'ler hayatta kalabilmek ve rekabet avantajı kazanabilmek için başka finansman kaynakları arayışına girmişlerdir.

Banka kredileri, devlet teşvikleri ve destekleri gibi geleneksel finansman yöntemleri, KOBİ'lerin ve iş kurmak isteyen yeni girişimcilerin finansman ihtiyaçlarını karşılamada yeterli olmamaktadır. KOBİ'ler, sermaye toplamak, sürdürülebilirliği ve büyümeyi desteklemek için risk sermayesi ve melek yatırımcılar gibi pek de eski olmayan finansman kaynaklarını kullanırken, bu kaynaklar bile sadece KOBİ'leri finanse etmek için yeterli değildir. Dijitalleşmeyle birlikte yaşanan küresel değişim süreci, finans sektörü de dahil olmak üzere hayatın birçok alanını etkilemiş ve yeni nesil finansman biçimlerinin ortaya çıkmasına neden olmuştur. Geleneksel finansman türlerinden yani borç ve özsermaye finansmanından ihtiyaç duydukları kadar yararlanamayan girişimciler, dijital platformlar üzerinden fikir ve projelerini anlatarak kendilerine finansman sağlayacak kitlelere ulaşmaya başlamışlardır. Dijital platformlar üzerinden hayata geçirilen yenilikçi yaklaşımlarla yeni nesil finansman yöntemleri hayatımıza girmiştir. Kitlese fonlama ve ICO (Initial Coin Offering) gibi "yeni" finansman kaynaklarının ortaya çıkışı, girişimci şirketlerin karşılaştığı zorluklara farklı bir perspektiften bakma olanağını ortaya çıkarmıştır. Bu yeni finansman kaynaklarının geleneksel finansman yöntemlerine göre birçok avantajı bulunmaktadır. Temas edebildikleri kişi sayısı, hızlıkları ve daha az masraflı olmaları nedeniyle geleneksel yöntemlere kıyasla öne çıkmışlardır. Ancak bu avantajlara rağmen güvenlik açıkları ve düzenleme sorunları bu yeni finansman kaynaklarının temel zayıflıkları da mevcuttur.

Son yıllarda girişim sermayesinin yeni işletmelerin finansman ihtiyaçlarını karşılamak amacıyla küçük ve orta ölçekli işletmelere ek finansman kaynağı sağlamadaki potansiyel rolü çok tartışılmış ve yenilikçi şirketler için risk sermayesi yatırımlarının daha çok tercih edildiği belirlenmiştir. Risk sermayedarlarının yeni işletmelerin gelişiminde ve finansal performanslarındaki olumlu rolü açıktır. Bu çalışma, risk sermayesi yatırımlarını etkileyen devlet destekli inovasyon değişkenlerini belirlemek için bir araştırma çerçevesi sunmaktadır. İş kurma kolaylığı, iflastan kurtulma kolaylığı, eğitime yönelik cari harcamalar, BİT (bilgi ve iletişim teknolojisi) kullanımı, kredi alma kolaylığı, özel sektöre sağlanan yerel mali kaynaklar, azınlık yatırımcılarının korunması, bilgi yoğun istihdam, yaratıcı ürün ihracatı, yerli patent başvuruları ve risk sermayesi arasındaki ilişki OECD ülkeleri için on yıllık bir süre olan 2012-2021 dönemi arasında incelenmiştir. Bulgular risk sermayesi yatırımlarını etkileyen temel inovasyon belirleyicilerinin iflastan kurtulma kolaylığı, kredi alma kolaylığı, cari eğitim harcamaları, BİT kullanımı, bilgi yoğun istihdam, yaratıcı ürünlerin ihracatı ve kişi başına düşen GSMH olduğunu göstermektedir.

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