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The "*chicken or egg*" problem between venture capital and start-up growth

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Alla mia famiglia,
per avermi costantemente sostenuto,
supportato
e guidato in ogni mia scelta,
senza farmi mai mancare niente,
aiutandomi a mantenere i piedi per terra
mentre la mia testa volava
tra i miei sogni e le mie aspirazioni più grandi.

A mio zio Piero,
uomo vero ed esemplare,
persona nobile e leale,
che da qualche mese mi sta guidando da lassù,
brindo con te ai miei traguardi futuri.

"O buono Appollo, a l'ultimo lavoro
fammi del tuo valor sì fatto vaso,
come dimandi a dar l'amato alloro.
Infino a qui l'un giogo di Parnaso
assai mi fu; ma or con amendue
m'è uopo intrar ne l'aringo rimaso."
Dante, Paradiso I 13-18, Divina Commedia

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GLOSSARY

Throughout the text, the terms in this glossary will be repeated several times with new elements added. The aim of this glossary is to provide a concise definition of the main terms dealt with in my thesis so that the reader can immediately understand the topics covered.

Start-up: a startup is a newly formed firm or organisation that is distinguished by its unique business concept, high growth potential, and pursuit of market disruption or solutions to problems.

Business angel: business angels are usually wealthy, well connected, and experienced individuals who funds as shareholders start-ups, expecting to make money out of them, although with little cash to invest compared to venture capital. From business angels, start-ups also take the experience, the networking, and the ability to actually do the business.

Venture capital: venture capital (VC henceforth) is the professionalization of the business angel, as venture capitalists are institutional investors. It is a type of private (institutional) investment in the equity of start-ups in exchange for ownership rights in the company. Venture capital's primary purpose is to assist and finance innovative and promising start-ups that have the potential to deliver significant returns on the investment.

Governmental venture capital: it is the same concept of venture capital, but, in this case, funds are provided to start-ups by government entities or agencies.

Equity gap: equity gap can be defined as "the difference between the amount of (risk) capital that would be invested under conditions of well-informed and competitive markets and the amount of capital actually invested" (Wilson, Wright, and Kacer 2018, 626).

ABSTRACT

The amount of venture capital invested in a country is typically viewed as the financial input needed for innovation-enabled economic growth. However, given how VCs function, it may also be viewed as a proxy for their expectations for this growth. So, if venture capital investment is low, it may be wiser to interpret this as a signal that something else in the economy needs to be corrected rather than the problem itself. The dearth of venture capital investments is impeding start-ups and economic growth, and it has led to a debate on whether or not it is right for governments to intervene to bridge the equity gap in the start-up and VC ecosystem.

Specifically, one side of the discussion believes that governments, with their involvement, would be able to generate a signalling effect, which will attract private investors (i.e., VCs), as well as an elimination of barriers to entry, tax breaks for research and development expenditures, and more favourable capital gain taxation.

On the other hand, there is a faction arguing that subsidies given by the government are just a way of throwing money at the problem and generate a crowding out effect of private investors, since public loans are less expensive and do not pretend to be engaged in decision-making, unlike private ones.

For the above reasons, this study aims to fulfil this research gap, by providing guidance to governments on what factors to act upon to establish a thriving ecosystem for start-ups and VCs, enabling them to generate a crowding in effect. After a systematic literature review on academic contributions on this topic, the factors that make up The Index of Economic Freedom by The Heritage Foundation have been identified to comprehensively explain the level of venture capital investments as % share of GDP in 36 OECD economies through linear regressions and correlations. Finally, an econometric model has been run in order to further provide evidence of how governments can intervene on each single factor and generate a forecasted change in the level of venture capital investments.

The study's findings demonstrate that The Heritage Foundation's Index of Economic Freedom explains the amount of VC investment throughout the time period examined, however, it is crucial to note that changes in these factors may not be immediately translated into changes in venture capital investments since it takes time for investors to become aware of and confident in the evolving regulatory position of a country.

1. Introduction

Innovation is the art that has enabled mankind to progress through the centuries, as it is the process of introducing new ideas, devices, and methods. Innovation constantly challenges the status quo.

Over its entire history, man has progressed through waves of innovation, moving in around 250 years from the first industrial revolution to sustainable technology, artificial intelligence, and the internet of things.

Nowadays, progress is driven by small companies that are creating new markets and new needs thanks to their disruptive ideas. Nevertheless, entrepreneurs, who establish a new innovative enterprise, often have financial constraints in financing their projects. Financial help and capital are needed to support activities such as research, product prototyping, production, patent, legal expenses, salaries, and marketing expenses. At each stage of a company's development, different levels of investment are required, increasing over time.

The significance of venture capital in supporting start-ups growth is generally acknowledged, and many policies aim to increase the availability of this type of finance. Nonetheless, there is doubt about venture capital's efficacy in generating predicted development if a country lacks significant economic dynamism and associated growth possibilities. In such situations, the absence of venture funding may be a sensible reaction from investors.

This thesis will look at the relationship between economic dynamism, start-ups growth, and venture capital availability.

In particular, the aim of this thesis is to fill the gap in the literature concerning the creation of an ecosystem that enables start-ups to grow and the factors that influence the level of venture capital investments.

As a first step, the present literature will be reviewed in order to present to the reader an overview of the role of start-ups and the challenges faced leading to market failure.

Market failure is a topic where the literature is divided on those who argue that government intervention is not due and those who demand it, so both thoughts and studies behind these arguments will be presented.

Then, how venture capital works and the debate on its role for start-ups will be discussed, presenting studies on which factors promoted by governments facilitated or hindered its development.

Finally, based on the literature reviewed and taking it a step further, the empirical study aims to propose some factors to be considered by governments to thrive start-ups' ecosystem and by entrepreneur and venture capital to decide whether establishing and investing in a country based on these surrounding factors.

Specifically, this paper will examine the relationship between the level of venture capital investments in 36 OECD countries and the 12 factors of The Index of Economic Freedom by The Heritage Foundation in the years 2007-2021, focusing on how variation in factor scoring could explain and drive a change in the level of VC investment.

The objective of the research will be to identify the presence of a link between venture capital investments and The Index, and then to investigate the role of its factors and their change, providing governments with useful results on which to intervene effectively, and entrepreneurs and venture capitalist with screening factors to drive investment decisions.

2. Literature review

2.1 Start-ups: features and challenges

According to Audretsch et al. (2008), young innovative enterprises have an important role in stimulating innovation and serving as a channel for knowledge transfer and capitalization.
Since start-ups are not plagued by organisational inertia, which could impede the development of radical breakthroughs by established incumbents, they are expected to be more successful in presenting disruptive and breakthrough technologies that offer fresh approaches to age-old problems (Henderson & Clark, 1990).
Furthermore, as a source of new jobs, radical inventions, and productivity development, as well as a tool for disciplining incumbent firms, innovative young enterprises play a critical role in modern knowledge-centred economies (Audretsch, 1995). In fact, innovation is one of the indispensable drivers for the growth of industrial countries, not only because it enables them to maintain their competitive position, but also because it can act as a stimulus for new investments and consumption.
As a result, numerous governments established measures to attract venture capital financing, such as the formation of governmental venture capitals, because the private VC market cannot completely bridge the equity gap faced by new innovative enterprises (Cumming et al., 2009).
If policymakers want to encourage growth through venture capital, incentives should be directed at encouraging more early-stage venture capital funding (Sapienza, Manigart, & Vermeir, 1996). Accordingly, Grilli and Murtinu (2014b) stated that GVC initiatives should seek to support principally those early-stage entrepreneurial ideas that were perceived as extremely promising but unable to get sufficient private resources to be implemented.
Block and Sandner (2009), in particular, observed how venture capitalists have grown more risk-averse, focusing on later-stage investments, after the recent financial crisis. In a recent study by Colombo, Grilli, and Verga (2007), it has been discovered that public support

increased the likelihood of high-tech firms receiving VC funding, particularly in the early phases of the start-up's life cycle.

As enterprises grow among the following developing stages, retained profits will allow them to auto-fund further expansion and growth and, aside to this, access to normal capital markets become easier, hence demand for VC funds declines.

Contrarily, VC supply generally follows the opposite pattern. Actually, VC suppliers are least interested during the first stages due to the high risk and cost involved (i.e., leading to uncertain returns). According to Aernoudt (2003), informal venture capital or business angels are believed to fill the void in the supply of funding during the seed and start-up stages. Venture capitals have less chance to make a difference when they are deployed to businesses at a later stage of development or in businesses that operate in technologically developed industries (Michelacci & Suarez, 2004).

As enterprises grow and mature, they are less interested in venture capital financing, although VCs become more interested in investing in the companies at these stages, as it would also entail equity ownership and influence over strategic company decisions.

In terms of direct public action, there is variation in how government funds are allocated to GVCs. Direct public funds, hybrid private-public funds, and funds-of-funds are the three forms of allocations. Direct public funds are investments made through government-backed VC-like initiatives with the purpose of fostering the creation of a VC industry within an area or industry. The challenges of these programmes have been the lack of expertise or crowding out, hence they have been adjusted to include co-investments from private investors. The crowding-out effect on private investors refers to the decrease in private investment that can be caused by government spending or intervention in the market. In fact, Cumming and Groh (2018) pointed out how governments needed to calibrate their interventions to not crowd out the availability of resources that market mechanisms already supplied. Critically, these public-private collaborations might be viewed as large-firm subsidies.

Finally, funds-of-funds is the last type of government assistance. This form of support consists in investing in other investment funds which, in turn, invest in start-ups, rather than directly investing in them (Colombo, Cumming, & Vismara, 2016).

A key component of successful entrepreneurship is experimentation. This point of view contends that policymakers need to let the market decide instead of trying to choose winners. As long as they have the flexibility to scale up or down in the case of productivity shocks, potentially successful entrepreneurs should be able to experiment with a variety of cutting-edge technologies and techniques within this framework. There is strong empirical support for the premise that businesses need room to test out a range of novel concepts, as successful start-ups frequently have a history of failure (Eggers & Song, 2015).

Empirical evidence from Hirukawa and Ueda's study (2003) suggested that VC industry development follows innovation activity, and not vice-versa.

According to Calvino, Criscuolo, and Menon (2015), the public discourse on entrepreneurship frequently ignored the fact that only a small percentage, often less than 5%, of beginning businesses went on to innovate and expanded. According to Shane (2009), encouraging entrepreneurship as a policy objective may not be the best course of action. Rather, policymakers should focus on helping the subset of businesses with the highest growth potential rather than subsidising all start-ups.

According to research conducted by Calvino, Criscuolo, and Menon (2016), policy barriers that are unfavourable to all enterprises can have an even bigger negative impact on start-ups. Policies may have been implicitly created with incumbents' requirements and conditions in mind, without considering the requirements and conditions of start-ups, which has led to delays or non-implementation of horizontal structural reforms that could help start-ups. The issue may also be made worse by regulations that are made to fit the technology used by established businesses rather than the cutting-edge technology employed by start-ups.

In fact, there is the risk that innovative start-ups cannot compete with the incumbents, nor they are viewed as suppliers or acquisition targets, so there will not be ground for entering the market and growing. Thereupon, governments could enact policies to eliminate barriers to entry for new companies and promote competition among incumbents (Djankov et al., 2002).

Consequently, if VCs are not willing to provide these start-ups funds, it should not be seen as a market failure, rather as the evidence that markets work extremely well. Money is undeniably important, but VC funds also need a thriving landscape to be able to support General Partners in growing their firms, recruiting managers, making deals, and structuring the next financing round or exit.

Actually, Grilli and Murtinu (2014b) found that, between 1994 and 2004, public-sector-related investors were involved in nearly 20% of venture capital investments in European high-tech enterprises that were 10 years old or younger. Nonetheless, Bertoni and Croce (2011) deemed these efforts as largely unsatisfactory.

Similar conclusions were drawn after that a recent study (Colombo, Grilli, & Verga, 2007) revealed that, at the time, the Italian technology policy initiatives aimed at high-tech start-ups weren't alleviating the inefficiencies in venture capital markets.

The level of VC investments in a country is usually interpreted as the financial input that allows innovation-enabled economic growth. However, given the way venture capitalists operate, it can also be seen as a proxy of the expectations they have with respect to this growth. So, if VC investment is low, it might be better not to view this as the problem to be solved directly, but as a signal that something else needs to be fixed in the economy.

Lerner (2009) highlighted four points which evidenced how the functioning of venture markets is misunderstood by public actions:

i. The establishment of a venture capital business is a long-term investment, requiring long-term commitment from politicians since it takes many years before tangible results are achieved, and the succession of different governments does not allow programmes aimed at helping VC markets to have continuity.

ii. The size of public initiatives can make promoting venture capital challenging. Too small programmes are unlikely to have an impact, as start-ups won't be able to go public or become a corporate acquiring target, and will not attract investors, but, on the other hand, too large programmes may crowd out private investment.

iii. Policymakers must recognise the need of flexibility in venture capital funding. Venture capitalists invest in early companies that encounter major uncertainties in technology, product market, and management. Adjustments in direction, as well as changes in product market strategy and management team, are necessary

components of the investment process. Nonetheless, public administrators frequently regard these shifts as deviations from the plan rather than natural evolution. The lack of flexibility imposed by government rules can impede the development and innovation of young businesses.

iv. The decisions on the allocation of public funds are sometimes influenced by political factors rather than economic ones. Moreover, government subsidies can cause distortions when special interest groups or politicians strive to divert the subsidies to benefit themselves.

Furthermore, there is a second type of market failure in venture capital markets which concern government intervention: externalities associated with research and development, and innovation. The promotion of innovation is a stated purpose of GVC programmes (Colombo, Cumming, & Vismara, 2016).

According to Arrow (1962), if markets operated freely, R&D investments would reach a welfare-suboptimal level, hence government innovation policies were legitimate to correct these market failures. Arrow (1962) also asserted that innovation must be publicly supported because it has public good features (i.e., non-rivalry), while Mazzucato (2015) stated that governments had an instrumental role in innovation, avoiding it to be undersupplied.

When there is intense competition for quality projects, Da Rin et al. (2006) appointed that it would be more beneficial to encourage innovation by boosting research and development funding than to increase venture capital industry funding.

Lerner (2002) explained how government could generate positive externalities by fostering innovation, as successful innovations bring new knowledge for competitors, which will use it as new input for further R&D expenditures.

As showed by Feldman and Kelley (2006), the U.S. Advanced Technology Program received additional financing after receiving a government R&D subsidy by external sources. Meuleman and De Maeseneire (2012) demonstrated that receiving an R&D subsidy improved SMEs' access to long-term finance using a dataset of SMEs from Belgium.

Colombo et al. (2012) explained that governments could also eliminate appropriability concerns regarding R&D spillovers, similarly to how they do with sensitive information.

Moreover, Colombo et al. (2007) noted that the degree of innovation of a firm was adversely related to VC investment, implying that investors may be more cautious when backing highly innovative projects. Therefore, governments have developed Innovation Investment Funds, government-backed funds that allocate their investments in projects with high potential risks and rewards, with the objective of fostering innovation and entrepreneurship. Cumming (2007) stressed the need for these funds to not crow out private investors and to invest alongside them, being that they may give extra value in addition to cash, such as access to networks, experience, and resources.

Bertoni and Tykvovà (2015) revealed that companies within VC portfolios did better in terms of innovation when they were also supported by GVCs as co-investors.

Patents are used to assess the impact that VCs have on the start-ups' innovation (Chemmanur, Loutskina, & Tian, 2012). Brander et al. (2008) experiment showed how government-backed enterprises were less likely to provide value-added to investors by developing patents. Bertoni and Tykvovà (2012) revealed that venture capital-backed firms outperformed GVC-backed enterprises when it came to patenting; the best outcomes, however, were found when independent VCs collaborated with GVCs. Brander et al. (2008) observed that VCs, operating more frequently in high-technology industries, had a higher impact on innovation than GVCs.

Building up on that, Klette et al. (2000) argued that knowledge creation will fall short of a welfare-generating social optimum since a free-market system may reduce private players' incentives to invest in creating new knowledge if there is no or limited intellectual property protection. Accordingly, Shapiro (2001) affirmed that designing intellectual property legislation to stimulate R&D was a powerful policy move.

Particularly, Tirole (1988) raised concerns about R&D spillovers which may hinder innovation provision since, when a company engages in R&D, the benefits of its discoveries may spread to other companies in the industry, lowering the firm's returns and making it less likely to invest in subsequent R&D. Although Kortum and Lerner (2000) recognized that VCs tend to foster innovation and to partially offset this limitation, Tirole (1988) recognized that governments could promote R&D and innovation by providing tax breaks or subsidies to companies that participate in R&D, or by directly funding basic research. Also, Hussinger (2008) affirmed that firms increased their R&D expenditures after receiving government support.

Financial resources are mainly provided by innovation policies (Brown and Earle, 2017).
However, fraud and corruption could arise if companies develop opportunistic behaviours following government policies, so, in designing grants to foster innovation, governments need to be careful with those companies that may simply specialize in obtaining grants, causing a market of unproductive entrepreneurship (Baumol, 1990).
Specifically, Haselmann, Schoenherr, and Vig (2018) revealed that having personal relationships with funding agencies made some companies in Germany receive the soft loans without needing them, depriving companies that needed them instead.
Opportunistic politicians, authorities, and corporations have the potential to take advantage of assistance schemes and active innovation policy. According to Karlson et al. (2020), this was demonstrated in Spain by an overly generous renewable energy legislation, which resulted in an unsustainable proliferation of wind and solar energy, plus excessive corruption.
On this example, Alvarez et al. (2009) concluded that the government's strong backing was ultimately detrimental since the consequent unrestrained expansion caused them to revoke their promised help in advance. Karlson et al. (2020) expressed their concerns on the ineffective policies which may endure in the long term, despite their limited effects, if supported by actors with power or if they are politically simple to justify.
Finally, rather than striving to oversee the free-market innovation machine, governments can unleash its welfare-generating engine by doing less but better (Baumol, 2002).

The most comprehensive measures aimed at addressing R&D underinvestment are based on various tax credit schemes (Arrow, 1962). However, empirical tests have failed to determine whether the societal gains of research and development tax breaks balanced the costs. (Box, 2009).
Similarly, Sandström et al. (2016) indicated that R&D policies were very context sensitive and difficult to generalise from. For example, Lach's study of Israeli innovation funding (2002) discovered good results for small enterprises but negative consequences for large firms. The fact that Wallsten (2000a) discovered that American R&D support mostly crowded out private money and had no good benefits, while Howell (2017) found on later research that the same programme had a favourable influence on the innovativeness of energy enterprises, supported

Colombo et al. thesis (2011) that the results showed variations depending on the employed methodology and on other factors, such as the sector or the region considered.
In addition, scattered results could be explained by the fact that multiple supporting activities assist businesses at the same time (Zúñiga-Vicente et al., 2014), thus, when enterprises received many support programmes, if there were conflicting effects, or if effects raised cumulatively, it become difficult to discern which of the supports had a probable influence (Karlson et al., 2020).
Government assistance in the form of subsidised or fully financed incubators has also been available to businesses, providing them with infrastructures, management guidance, networking support, and other resources needed (Karlson et al., 2020).
However, it has been studied by Lukeš et al. (2019) and by Schwartz (2013) that, when incubators support end, there is not a discrepancy in terms of performance between incubated and non-incubated companies. Nevertheless, Ejermo (2018) found that incubated firm exceeded non-incubated firms in terms of innovation, measured in terms of patenting activity.

The success of targeted innovation initiatives has been put into doubt, and it was believed that this was due to a flawed theoretical premise. Market failures in innovation may not be the most significant impediment to societal innovation, as organisations and markets can work past knowledge investment and appropriation concerns.
Labour mobility has been highlighted as an important strategy for sharing knowledge relevant to the occurrence of innovations by Nelson and Winter (1982), who stated that the innovation process started with the departure of workers with unique expertise from a factory, which in turn caused a change in an established routine in both the original and new organisation.
In this light, Wennberg (2009) declared that labour mobility within a competitive labour market is a critical mechanism for distributing knowledge related to innovation, as this knowledge is entrenched within individuals. Empirically, Marx (2011) demonstrated that US-states that used non-compete agreements to deter competent people from changing firms had lower rates of patenting activities. In Europe, Fu and Larsson (2018) evidenced that countries with tougher labour market restrictions had a lower frequency of innovative entrepreneurship.
VC industry is critical in discovering businessmen with potential prospects and connecting them with the resources they need to capitalise on such chances (Gompers & Lerner, 1999).

Lastly, governments consider academic entrepreneurship as a factor that can influence innovation. In fact, university-sponsored VC reflected academic institutions' most direct participation in investing through equity investment in new companies based on technology related to faculty members' scientific disciplines. The universities intend to form a venture capital fund to monetize the technologies developed by their faculty members. They also want to use the additional cash gained through this venture capital fund to speed the commercialization of the technology generated by their scientists by forging collaborations with corporations and launching university spin-off firms (Grilli & Murtinu, 2014b).

Indeed, governments view universities more positively in terms of innovation diffusion, and the proportion of public investment in a VC fund influences the likelihood of a VC fund investing in university spin-offs (Knockaert et al., 2010).

However, as appointed by Lerner (2005), most universities are unable to offer salary comparable to what corporate venture capital investors or independent venture capital companies provide to their managers due to compensation limits. As a result, university offices have experienced situations in which new workers, often Ph.D. candidates, stay long enough to become acquainted with the licencing procedure and gain business experience before departing for the private sector.

On the other hand, Lerner (2005) revealed that universities could put their endowment to discover and identify high quality prospects companies and connect these enterprises with VC investors.

In a recent study by Grilli and Murtinu (2014b), it has been found that the impact of university funds was consistently inferior to that of government ones. According to Laredo (2007), university VCs are predicted to have a growing role in the coming years.

There is the risk governments are not considering how complex the innovation system is, as their policies are mainly aimed at providing support upstream (i.e., funnel money into VC funds), rather than trying to clear any downstream impediments. Grilli and Murtinu (2014a) argued that, instead of taking a hands-on approach, public interventions should focus on fostering a favourable climate through indirect forms of assistance. Whenever you find yourself

in a difficult environment that is impeding your success, you have two choices: leave it or take command and fix it. To foster a thriving start-up ecosystem, policymakers should prioritise improvements that simplify regulations, eliminate unnecessary red tape, and dedicate funding to critical infrastructure.

Growth company promotion by venture capital is impossible in the absence of potential firms to market, talented individuals with innovative ideas and an administrative, legal, and financial framework that supports their commercial idea-exploitation (McGlue, 2002).

The development of venture capital can only be considered in the context of the harmonious development of the financial system as a whole, which requires continuous, articulated and coherent support, and not merely occasional interventions.

2.2 The everlasting dilemma over government's role and market failure

The role of the government in markets has long been a source of debate among economists worldwide, with two factions discussing whether governments should intervene when resources are not efficiently allocated within markets. Indeed, markets are essentially about resource allocation, and they can be thought of as the "brain" of the entire economic system, the central locus of decision making: if they fail, not only will the sector's profits be lower than they would have been otherwise, but the overall performance of the economy may suffer (Joseph E. Stiglitz, 1993).

In most modern industrial economies, the private sector, rather than the public sector, is the primary source of goods production and distribution. The notion that this economic system leads to effective allocation of resources is a persistent economic concept.

Economic efficiency depends on a few key assumptions: markets being complete, markets being perfectly competitive, and all agents in the market making rational decisions based on full information.

To an economist, market efficiency means that the allocation of resources generated by the market is Pareto optimal: no individual or preference criterion may be improved without compromising at least one other individual or preference criterion (Vilfredo Pareto, 1906).
When efficiency is not reached, we talk about market failure, which, according to Bator (1958), can be defined as "the failure of a more or less idealized system of price-market institutions to sustain desirable activities or to estop undesirable activities" (pp. 351).
Bourne (2019) doubted about the possibility for markets to meet all the three conditions (above mentioned) for being perfectly efficient and that this should not entitle governments to intervein, otherwise the scope for its intervention would be unlimited. According to him, finding deviations from some imagined perfect world is not reason enough for intervention, especially considering that governments are imperfect too, therefore it would be unrealistic to consider they would be able to perfectionate markets. The author argues that markets are inherently flawed and that government intervention, such as taxes, subsidies, and regulations, can be used to enhance social welfare in the presence of issues. However, the main focus of the article is to highlight how weak reasoning by supporters of intervention can lead to inferior policies. The best economic analysis evaluates the impact of intervention on outcomes in comparison to realistic alternatives, including non-intervention and other policies, instead of comparing it to hypothetical perfectly competitive markets that do not exist in reality. In a recent study by Mihalache and Bodislav (2019), four examples of why market fails are presented and analysed:

i. Monopoly.

   It implies the existence of a higher price than that applicable on the market, as well as a lower level of production than that which can ensure an efficient process of consuming the resources. In particular, increasing yields of production cause marginal costs to decrease and this leads to a mismatch between price and marginal cost, with companies tending to become monopolists. However, the authors highlighted how pure monopoly situations are becoming increasingly rare.

ii. Information asymmetry.

Consumers and producers are not correctly and completely informed on the market's circumstances, which can result in losses for both parties. For the market to be efficient, individuals should have free access to all available information. However, from the consumer's perspective, there are two types of incomplete information: moral hazard and adverse selection. On the latter, Akerlof (1970) created a model with empirical studies on how consumers are impacted.

iii. Externalities.

They occur when an individual's behaviours have an impact on the utility of another person. In this situation, market failure is caused by the actions of a producer or consumer and results in some costs or gains for tertiary economic players. Externalities generate inefficiency since economic individuals take actions considering only their costs and benefits and without considering the impact those actions have on the community, and without incorporating these costs/benefits in the price of consumption.

iv. Public goods.

Samuelson (1954) observed that public goods intrinsically have two main features: they are non-rivalrous goods, goods that are consumed by people but whose supply is not affected by people’s consumption. This means that once they are made available to one person, they can be enjoyed by others at no additional marginal cost; secondly, collective goods are non-excludable, which implies it is difficult or even almost impossible to prohibit any person from using the good. In addition, public goods make markets inefficient since private companies refuse to provide that good/service being not able to be paid for it and because offering a public good to a new individual has no new cost incurred, so it would be inefficient to set a price.

According to Stiglitz (2000), there are six reasons why the market mechanism may not result in a Pareto efficient resource allocation: failure of competition, public goods, externalities, incomplete markets, information failures, and unemployment. Those failures justify an active role for governments in financial markets. He supported his idea bringing the example of East Asia's fast rising economies, where the government has taken an active role in building financial institutions, regulating them, and directing credit, both to improve the economy's stability and the solvency of financial institutions, as well as to improve growth prospects. In addition, Stiglitz explained how there could be two more factors for government action, even though market is Pareto efficient: first, a competitive market may result in an unfavourable income distribution; and second, despite being well-informed, individuals may not always make rational choices regarding their consumption of goods, which serves as a rationale for implementing regulations that limit the consumption of certain goods and promote the public provision of merit goods.

Adam Smith (1776) argued that business competition prevents consumer exploitation by promoting fair prices and quality products, encouraging continuous economic innovation, and satisfying consumer demand. In simple terms, competition helps to keep everyone honest because customers who are treated unfairly by one business can always patronize another.
Additionally, he held the belief that competition would incentivize individuals to promote the public interest while pursuing their own self-interest, as if guided by an invisible hand. This is evident in his work, An Inquiry into the Nature and Causes of The Wealth of Nations (1776), where he wrote that “it is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity but to their self-love” (p. 20).
Smith's argument is straightforward: if there is a demand for a product or service that is not currently being offered, people will be willing to pay for it. Entrepreneurs, driven by the pursuit of profits, are constantly seeking out such opportunities. When the value of a commodity to a customer is greater than its cost of production, entrepreneurs will produce the commodity and make a profit. Similarly, if a more cost-effective method of producing a commodity is

discovered, the entrepreneur who implements it will outperform other competitors and gain profit.

Therefore, profitability is achieved through the search for more effective production techniques and the creation of new commodities that better fulfil the needs of consumers.

Adam Smith set a course change in the common credence of that period. In fact, prior to Adam Smith, the dominant system of economic thought that prevailed in Europe from 16th to 18th century was Mercantilism (Willes, 1971), founded on the idea that the world's wealth was static, and, as a result, a strong central authority (government) was found to be crucial for market expansion, in order to support industry and trade aimed at increasing its wealth and national dominance.

Adam Smith held the view that the market itself acts as a mechanism to determine what goods should be produced and which producers are most efficient. Government are not necessary to make these decisions. In Smith's opinion, if a product passes the market test by being in demand and profitable, entrepreneurs will produce it, and if a producer is inefficient, competition will lead them to exit the market.

In conclusion, the Scottish Economist believed there is no need for governments to intervene and to regulate markets aiming to achieve public best interests given that the presence of competition drives a high level of efficiency and serves as a significant motivator for innovation.

Adam Smith's free trade idea has been supported by Say's law (1803), which could be seen as an extension of Adam Smith's vision.

Say's Law contradicted the Mercantilism viewpoint that money is the source of wealth.

To Say, money was not an end in itself, rather it was a vehicle of transferring actual economic benefits, to exchange the value of previously produced goods for new goods as they are produced and brought to market. He noted that the shortage of some items and abundance of others might endure when the breakdown in production is worsened by government intervention.

As a result, Say's Law supports the belief that governments should not meddle with the free market and should practice laissez-faire economics.

Similar to Smith and Say's view, Thomas Malthus (1798) and Ludwig von Mises (1949) claimed that government intervention in the economy is inherently inefficient and harmful to economy and human prosperity. Malthus contended that markets innately regulate themselves,

and that government intervention would only disrupt this equilibrium. Malthus advocated laissez-faire economic policies, believing that government should not intrude with market functioning.

Mises contended that free markets, in which individuals are free to make economic choices without state intervention, are the most efficient way to organise an economy and promote prosperity and wealth. He also believed that government interference in the economy erodes individual liberty and political and economic liberty. He was a proponent of a minimal state and a staunch supporter of classical liberalism's principles.

On this current of thoughts, Ricardo (2004) believed that allowing the free market to operate without interference from the government would result in the most efficient allocation of resources and the greatest economic growth. He believed that government intervention in the economy would only distort the market and lead to inefficiencies. He also objected government intervention in the way of price controls, believing that it would only lead to shortages and black markets.

On the other hand, Ricardo did not advocate for a complete lack of government involvement in the economy, rather to intervene as little as possible. Thus, he believed that the government had a role to play in providing certain public goods necessary for economic growth (i.e., infrastructure and education). He also believed that the government had a responsibility to ensure that the market worked fairly, and that monopolies and other forms of market manipulation were prohibited.

Conversely, Lewis (1955) believed that the government had a critical role to play in fostering economic development during the initial phases of a nation’s growth, particularly in the process of industrialization. He contended that the government should actively promote the growth of advanced, capital-intensive industries, which he saw as the key to economic growth.

Lewis also believed that, as the economy progressed, the government should gradually decrease its market intervention and shift toward a more open and competitive economy. He contended that government intervention should be used strategically and selectively to address market failures and promote economic growth and development.

Musgrave (1959) was a firm believer that government can play a beneficial and constructive role in society, and that economists can help make government run better, so contributing to a

better society. As a matter of fact, his conviction can be immediately deducted after reading the introductory quote of his work, where is pointed out that “Intelligent conduct of government is at the heart of democracy”. Musgrave's theory classified governmental economic activity into three categories: resource allocation, distribution of goods and services, and overall economic stabilization.

In keeping with his theory, public finance should be devoted to the problem of achieving full employment, using Keynesian fiscal policy principles to enhance aggregate demand through tax cuts and government spending. Furthermore, public financing should be oriented toward economic efficiency (i.e., on the design of taxes that would collect revenue with the least amount of distortion to incentives and, as a result, the least amount of loss of real income). Finally, government economic activity should address redistribution difficulties in order to establish a politically acceptable income distribution.

Along with Musgrave, Samuelson's (1954) analysis is centred on government role in markets. Peculiarly, Samuelson recognized Musgrave effort in the theory of public expenditure, against economists of that time that were rather focused on the theory of taxation.

Samuelson's research is centred around determining the ideal allocation of public spending in terms of Pareto efficiency, which asserts that it is impossible to enhance the welfare of one individual without causing a decrease in welfare for another.

The policy implication he draws is that both laissez-faire reliance on markets and voluntary exchange public finance result in suboptimal outcomes by failing to get the community to the ethically best point on the utility frontier.

Through a fictional history, Samuelson (1958a) presented his perspective on the essence of government and public finance:

> “Once upon a time men on this [imagined] planet were all alike and very scarce. Each family hunted and fished its symmetrical acres; and each ended with the same production and real income.
>
> Then men turned to cultivating the soil and domesticating animals. This left even more of the globe vacant but did not disturb the symmetry of family incomes.
>
> But finally, population grew so big that the best free land was all occupied. Now there was a struggle for elbow room. According to the scenario as I choose to write it,

the struggle was a gentlemanly one. But men did have to face the fact that recognizing the squatter's rights and respecting laissez-faire did result in differences of real incomes among families.

Optimal transfer expenditure. Here, then, for the first time, government was introduced on this planet. A comprehensive program of redistributing income so as to achieve a maximum of the community's social welfare function was introduced. The budget was balanced at a non-zero level: taxes were raised in a non-distorting lump-sum fashion, and transfer expenditure was allocated among families so as to achieve the marginal conditions necessary to maximize the defined social welfare function…

Now why do I describe so bizarre a model? It is to underline this theoretical point: Given a social welfare function and given the absence of all technological and taste externalities, and given universal constant returns to scale, there would be needed only one type of public policy-redistributive transfers. (pp. 332–33)"

Part of Musgrave's work is founded on Wagner's law (1883), which is based on the empirical observation that when national income rises, so does governmental spending. Wagner recognized something inherent with economic progress that would lead to the State playing a bigger role.

Wagner originated the idea that the expansion of government spending is correlated with the growth and transformation of society. According to Timm (1961), Wagner's law of increasing government expenditure was not meant as a prediction, but rather as a general tendency. Wagner proposed that the law would remain in effect as long as cultural and economic progress continued, but these terms are hard to define. He investigated the idea of a desired cap on the size of the public sector, acknowledging that there would be a ceiling to government growth due to taxpayer resistance when taxes reduced their personal consumption, ultimately dismissing attempts to set such a limit and asserting that such limit could not be established. Timm, on the other hand, pointed out that Wagner made no specific limits on the cultural and economic progress that would drive the increase in government activity.

According to Wagner, the trajectory of government spending is essentially influenced by the growth of a nation's income or GDP over time. Specifically, the principle is linked to

industrialization, forecasting that the expansion of an industrial economy will be followed by an increase in the share of public expenditure in Gross Domestic Product as a consequence of pressures for social progress. For instance, it was observed and noted by Wagner in many Western European countries. Wagner claimed that the State's expenditure increases steadily with development.

His law is based on three claims: economic growth increases complexity, necessitating the continued introduction of new laws and the development of the legal structure; secondly, urbanization increases negative externalities (e.g., congestion and crime), entailing intervention; lastly, public-sector goods have a high-income elasticity of demand (i.e., if demand elasticity is above one, public sector spending as a percentage of GDP will grow). According to Bird (1971), this last claim of elasticity was based on two assumptions. To begin with, most public goods were considered luxuries, and total government spending was income elastic. Second, economic growth was thought to breed market failure. However, Bird claimed that neither assumption has been addressed empirically, whereas his study found empirical evidence supporting the existence of Wagner's law.

The elasticity of the relationship between the proportion of government spending on general expenditures and per capita GDP has been studied by Ram (1986a, 1986b, 1987). He divided the analysis into two parts: time series and cross-sectional. The time-series analysis examined 115 countries from 1950 to 1980 and discovered little variance among the various categories of countries. Out of the 115 countries investigated, 41 had an elasticity less than one, while the remaining 74 showed a 5% significant association.

The findings indicate that in many instances, the relationship between government spending and GDP in terms of elasticity is weaker than one. Based on these findings, it appears that Wagner's hypothesis is not supported.

Easterly and Rebelo's research (1993) was divided into two periods: a cross-sectional analysis of 115 countries from 1970-1988, and an analysis of 26 countries spanning the period of 1870 to 1988. From both, it has been discovered robust support for Wagner's Law.

In a study where data from 86 countries was evaluated, Koop and Poirier (1995) revealed that only one-third of them agreed with Wagner's hypothesis, after having investigated the relationship between the long-term elasticity of government spending per capita and per capita income.

Stein et al. (1998) made a comparison between Latin America and OECD countries and demonstrated that a larger role is played by the public sector in more prosperous nations. To put it differently, nations with a higher overall income tend to have a more extensive public sector.

Countries with low per-capita GDP have shown a stronger correlation between government activity and economic growth in a research conducted by Lamartina and Zaghini from 2011 on 23 OECD countries. This study had two important implications: firstly, during the catching-up stage, government activity is more important in comparison to more advanced economies. Secondarily, the direct relationship between rising government activity and economic growth may be more valid during the early stages of development than later on, in accordance with Wagner's hypothesis.

According to Arpaia and Turrini's findings (2008), there is a long-term relationship between government spending and potential output in the EU countries, with government spending increasing roughly in proportion to potential output.

Between 1850 and 2010, data from five developed European countries were collected by Kuckuck (2014) to study the connection between Wagner's Law and a country's development stage, discovering that the connection between government spending and economic growth weakens as countries advance in development, which is in line with Wagner's hypothesis.

In a recent study by Afonso and Jalles (2014), a panel data set of 155 developed and developing countries from 1970 to 2010 has been used to assess how causality runs and to test the possibility of Wagner's law. They discovered strong evidence of causality from government spending to per capita GDP, supporting the idea of Wagner's law. On the issue of causality, Hakro (2009) finds evidence that government spending stimulates growth (analysed period 1830-1993). Kumar (2009), using time series techniques on the same sample, concludes that Wagner's law does apply to East Asian countries from 1960 to 2007.

On the other hand, Peacock and Wiseman (1961) dealt with the trend of government spending and determined that it does not rise in a steady and consistent way, as enunciated by Wagner, but rather in abrupt and discontinuous increments.

According to Peacock and Wiseman, in an economy, when a social or other disturbance occurs, such as a war, there arises a need for increased expenditure due to the inadequacy of existing public revenue to address the problem. Previously, in the absence of pressing demands, government expenditure growth was mostly led and limited by income restrictions. Such

constraints are no longer applicable due to changes in requirements caused by social, economic, or other disruptions.

This means that fiscal activities tend to increase gradually over several decades to address various social and economic disruptions, rather than happening in a continuous and smooth manner. As the government's spending rises, the inadequacy of the current revenue is revealed. To support the hypothesis, Peacock and Wiseman provided three distinct concepts:

i. Displacement effect.

In the event of a social disruption, the state increases its revenue by raising taxes and also boosts public spending to tackle the issue at hand.

This induces the replacement of current taxes and expenditures with higher tax and expenditure levels in order to maintain the same standard of living for citizens. The displacement effect is the movement from an older level of expenditure and taxation to a new and higher level.

Anyhow, people tend to adapt to the new amount of taxes when the disruption fades, becoming more receptive of greater levels of government expenditure. This causes a shift in living standards, with the new distribution of government spending and revenue stabilising at a higher level. This stabilisation, however, is only transient and is susceptible to new perturbations, which might result in another displacement effect.

ii. Inspection Effect.

This effect refers to the consequence of new expenditure on people's standard of living that they are hesitant to let go off because now there are new areas of attention for the government, which leads to expansive fiscal operations to take over functions that were previously neglected. There is no compelling reason to revert to reduced taxes, even in the absence of new disturbances.

As government and people attain to a new level of tax tolerance, a higher tax burden is accepted to let the level of expenditure and revenue rise. Thus, until another disturbance

generates a displacement effect, government spending and revenue remain stable at a new level.

iii. Concentration Effect.

The central government's economic activities tend to increase at a faster rate than those of state and local governments when an economy is growing, which is known as the concentration effect. This effect is linked to the political structure of the country, resulting in the government assuming a greater proportion of the gross national activity with each significant disturbance.

A disturbance in the economy was the Great Depression, which inspired Keynes' theory on government intervention to stabilize the economy.

John Maynard Keynes (1936) argued that markets are inherently unstable and prone to long periods of unemployment and underproduction.

Markets are inherently unstable, according to Keynes, because they are driven by the decisions and expectations of individual actors. These actors are frequently influenced by psychological factors such as fear, optimism, and herd behaviour, which can lead to irrational decisions and market fluctuations.

Keynes proposed using government intervention to stabilise markets and promote economic growth to address these issues. During economic downturns, he argued, governments should use fiscal and monetary policy to stimulate demand and increase employment, while during booms, they should use fiscal and monetary policy to restrain demand and inflation.

Overall, Keynes believed that markets alone are insufficient to ensure long-term economic growth and stability, and that active government intervention is required to promote long-term economic growth and stability.

According to Keynes' fiscal stimulus theory, an increase in government spending ultimately leads to increased business activity and even more spending (multiplier effect). According to

this theory, spending increases aggregate output and generates more income. Based on this theory, one dollar spent on fiscal stimulus generates more than one dollar in growth.
For decades, this theory was the dominant paradigm in academic economics. Other economists, such as Friedman and Rothbard, demonstrated that the Keynesian model misinterpreted the correlation between savings, investment, and economic growth.

Friedman and Schwartz's views (1963) views on monetary policy were diametrically opposed to the dominant viewpoint at the time (i.e., Keynes), which emphasised the use of fiscal policy, such as government spending and taxation, to stabilise the economy. They contended that monetary policy was more effective in stabilising the economy, while fiscal policy was less effective due to political pressures.
Monetarism, according to Friedman and Schwartz, is the belief that the money supply is critical to the economy and that monetary policy is the most effective tool for economic stabilisation. The authors argued that in order to stabilise the economy, monetary authorities should rather focus on controlling the money supply, which they should do by setting and meeting targets for a specific monetary aggregate.
They were an outspoken supporter of free markets and minimal government intervention in the economy. Friedman and Schwartz contended that free markets produce efficient outcomes, whereas government intervention in the economy frequently produces inefficiencies and unintended consequences.
Minimal government intervention was also supported by Solow (1956), who believes that government intervention can distort market forces and emphasises the role of markets in achieving efficient outcomes. However, he recognized that certain forms of government intervention, such as investment in public goods such as infrastructure, and research and development, can promote economic growth. Similarly, Swan (1956) asserted that government intervention should be used exclusively to promote growth and efficiency while also correcting market failures.
Feldstein (1978) believed that excessive government intervention can result in negative consequences such as inefficiency and economic disruption. He favoured policies that reduced taxes and government spending, resulting in a smaller role for government in the economy.

Furthermore, he emphasised the role of monetary policy and advocated for the adoption of interest rate policy as a means of economic stabilisation.

King and Rebelo (1990) discovered that government policies have a significant impact on a country's economic growth rate. Policies can have these effects because they influence private incentives for physical and human capital accumulation. Policy-induced changes in incentives, even minor adjustments in tax rates, can lead to prolonged periods of stagnation or regression if growth incentives are removed, or to spectacular economic growth if growth incentives are provided.

De Tocqueville (1835) suggested that government action should be limited to preserve individual liberty, and he further acknowledged the importance of government in promoting the social welfare and securing social order, as well as allowing individuals to pursue their personal interests, maintaining market stability, deterring monopolies from emerging, and guaranteeing workers a fair treatment. On the other hand, De Tocqueville believed that the government should not intervene in the market and that the market should be allowed to run freely. He stated that the government should not attempt to control prices, wages, or output, nor should it protect specific industries or groups of workers.

On this wave, Boskin (1978) has supported limited government intervention in economic matters, criticizing government policies such as welfare programs and price controls, arguing that they can lead to inefficiency and market distortions. Boskin has also been a proponent of free trade, arguing that lowering trade barriers can lead to economic growth. However, he believed that the government must play an important role in supplying certain public goods and services, such as national defence and basic research.

Rothbard (1970) believed that government intervention in the economy was always harmful and that allowing the free market to operate uninhibitedly would result in the greatest prosperity and well-being for all individuals.

Rothbard argued that government intervention in the economy causes inefficiencies and distorts market signals, resulting in resource misallocation and stifling economic growth. He believed that government regulations, subsidies, and other forms of intervention artificially bolstered certain businesses and industries at the expense of others, preventing market forces from functioning normally.

The economist also believed that government intervention frequently results in a transfer of wealth from productive to unproductive members of society, who he believed benefited from various types of government welfare, aid, and other programs.

He also claimed that, in addition to having a negative impact on the economy, government intervention had a negative impact on personal freedom and individual rights. Rothbard believed that an individual's right to private property was absolute and that any government interference with this right was unjustified.

Rothbard's views (1973) on government intervention can be categorised as anarcho-capitalism, which advocates for the abolition of government and the replacement of all government services with the establishment of a purely free-market economy that would result in greater prosperity and freedom for all individuals.

On the empirical front, a negative relationship between the social expenditures and economic growth has been founded by Landau (1983), Barro (1989), Grier and Tullock (1989). On the other hand, Aschauer (1989) revealed a positive relationship, whereas Kormendi and Meguire (1985) found no significant relationship.

Lucas (1990) pointed out that studying past relationships between economic variables may not hold in the future, as individuals and companies could change their behaviour following governments policies. In fact, the economist contended that macroeconomic models based on historical data may be ineffective at forecasting the effects of policy changes because people's behaviour may change in response to the policies. Therefore, he asserted that policies aimed at stabilising the economy by manipulating interest rates, the supply of money, and other macroeconomic variables may cause inefficiencies and distortions.

Armey (1995) developed a curve (i.e., the Armey curve) to assess the government’s influence in the economic activity. In particular, the curve is an inverted U-shaped curve that illustrates the relationship between government spending and the GDP growth rate. It takes into account the law of diminishing returns and demonstrates the government's role in the economy, as represented by the ratio of government expenditure to GDP and the actual growth rate of GDP. Armey postulates that without a public sector, the economy would produce minimal output. At low levels of government spending, the government may not be able to ensure the enforcement of private contracts and property rights, resulting in minimal growth. On the other hand, when

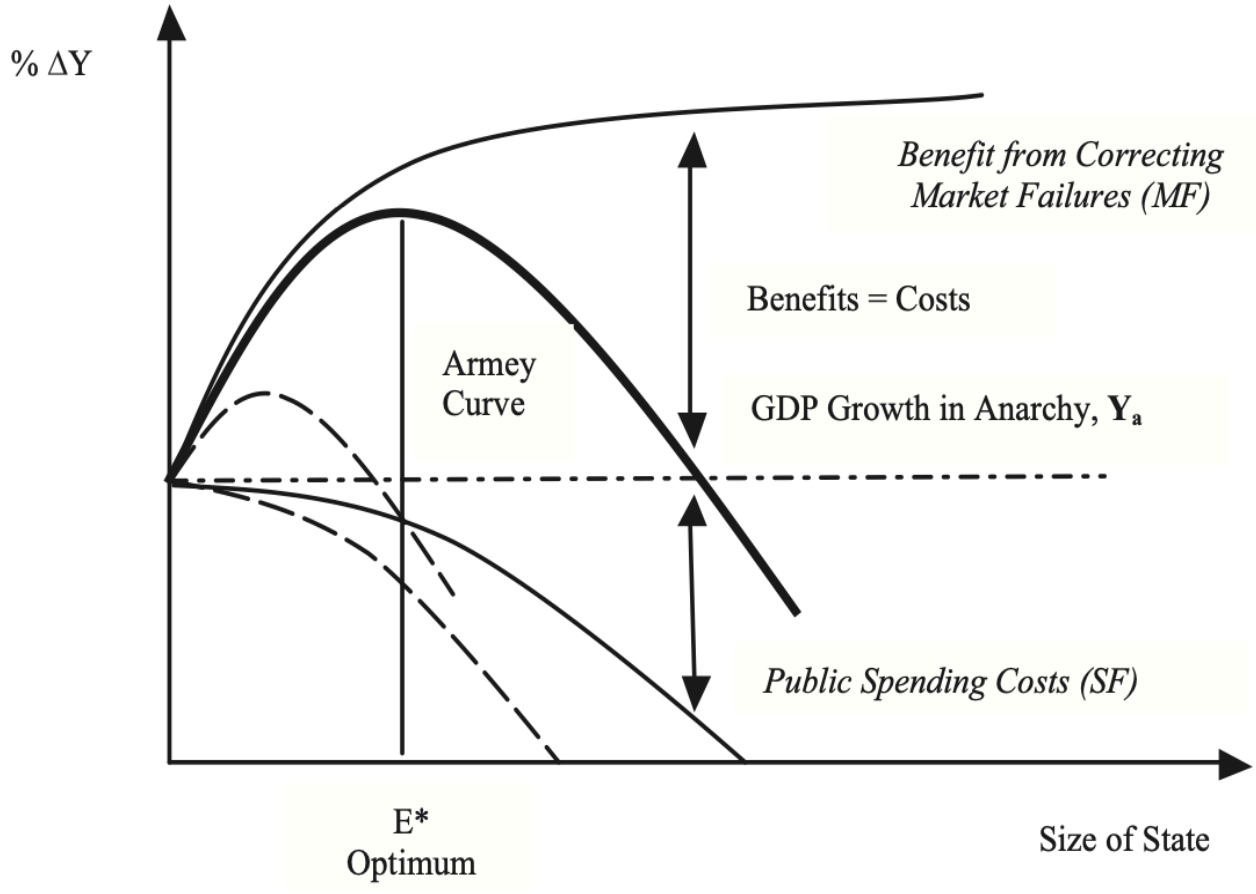
government spending is extremely high, the high taxes necessary to fund this level of expenditure discourage citizens from investing and producing, resulting in low growth once again. As a result, it is reasonable to believe that as public expenditure increases, GDP growth also increases. On the other hand, decreasing the public expenditure will lead to an increase in GDP.

Facchini and Melki (2011) examined in depth the Armey curve and concluded that the curve could be understood better if divided into two parts, represented by the costs of government failures and the advantages of market failures correction.

This allowed for the creation of a single theoretical framework that combined two rival sets of hypotheses.

The benefits of rectifying market failures explain the positive effect of government spending, while the costs of State failures explain the negative effect. Figure 1 depicts the market failures curve, which shows the positive effect of government expenditure with decreasing marginal productivity, which is connected with market failure correction.

Figure 2.2.1 - The Armey Curve's decomposition in relation to growth and government size.



Source: Armey, D. (1995). The Freedom Revolution. Regnery Publishing Co, Washington.

Its shape is a result of two distinct factors: the law of diminishing returns and the fact that when there is no more market, there are no longer market failures. As a result, public spending has a positive impact on economic growth but with a decreasing marginal effect. In contrast, the State failures curve describes the negative effect of public spending, with increasing marginal effects. The theory of State failure explains both the non-optimality of government size and the negative effect of public spending on GDP growth rate. The costs of government expenditures represent the descending portion of the Armey curve and stem from various reasons, such as political transaction costs, tax effects on market transaction costs, rent-seeking activities, and bureaucratic extra expenses. The political transaction costs describe the displacement costs. As

a result, the inverted-U shape of the curve is the result of the benefits of correcting market failures and the repercussions of government failure.

In Figure 1, E* represents the ideal amount of government intervention. Prior to E*, the additional benefits of correcting market inefficiencies outweigh the additional costs. This implies that, in the absence of government intervention, public spending would be zero, and Y_a would be the GDP growth rate. Beyond E*, the benefit-cost gap narrows, resulting in negative net benefits. Therefore, increasing government intervention to correct market failures may not be beneficial as the costs may surpass the benefits. If the level of government intervention is kept at E*, the GDP growth rate is optimized.

Empirical studies discovered that the growth effect of a change in expenditure is critically dependent on how the change in expenditure is financed. For example, Miller and Russek (1993), for a panel of annual data for 39 countries, found that changes in expenditure financed by taxation have insignificant growth effects, and that where negative effects do occur, they are typically associated with budget deficit-financed changes in taxes or expenditures.

Kneller et al. (2001) discovered that government spending has a negative impact on economic growth, but the magnitude of this impact varies depending on the sources of government spending. The research revealed that government spending financed by borrowing has a greater negative impact on growth than spending financed by taxation. According to the study, the negative impact of government spending on growth is especially pronounced in economies with high debt-to-GDP ratios.

Puviani (1903) analysed various forms of taxes and the effect they have on economy and society. According to Puviani, the most efficient taxes are those imposed on consumption because they are less likely to hinder production and investment. He also claimed that taxation on land and property were efficient because they did not fluctuate as much as income or profits tax.

He also discusses the role of progressive taxation, which imposes higher rates of taxation on greater income levels. He asserted that progressive taxation could redistribute wealth and reduce income disparity. However, he warned that progressive taxation can discourage work and investment, resulting in slower economic growth.

In addition, Puviani also analysed the role of the State, arguing that it should play an important role in promoting common good and social order, although its intervention should be limited to what is strictly indispensable as well as the fact that the State should be as small as possible. In

fact, he argued that the State should not intervene in the market and that it should be allowed to operate freely, even though government intervention might be required to maintain market stability and to block monopolies. Moreover, Puviani believed that the government should refrain from attempting to control prices, wages, or production.

In another study on long-term growth, Kneller et al. (2004) found that an increase in government spending can lead to a decrease in long-term economic growth, with the effect being more pronounced in countries with higher levels of government spending. They also observed that in countries with high levels of public debt, the negative relationship between government spending and growth is more marked.

There have been many attempts by empirical studies to establish a linearity in the relationship between a state expenditures and its economic expansion, as well as other studies attempted to find the degree of government spending which would have maximised the growth rate.

The ceiling on government size, which maximises the growth rate, is a value below which any increase in government spending has a positive effect on growth; on the other hand, any increase in government spending has a negative effect on growth. However, the findings are still questionable.

Thus, several research have suggested that the inconclusiveness of previous studies may be due to attributing a linear relationship between the effects of government spending and economic growth, which would rather be non-linear (Sheehey, 1993; Vedder & Gallaway, 1998; Chen & Lee, 2005).

Sheehey (1993) finds that when government size (i.e., government consumption expenditure/GDP) is less than 15%, there is a positive relationship between government and economic growth. In contrast, when government size exceeds 15%, the relationship becomes negative.

Karras (1996) investigates the role of public services in production from 1960 to 1985 to calculate the appropriate size of government for different types of economies. According to the empirical findings, services offered by governments are considerably efficient and over-provided in Africa, under-supplied in the region of Asia, and ideally supplied throughout the United States and the European continent. Furthermore, 23% has been identified as the average country's optimal government size by his findings, while it ranges from 14% for the average OECD country to 33% in South America. Karras (1997) examines 20 European countries from 1950 to 1990 and concludes that the optimal government size is 16% and that the marginal

productivity of government services is negatively related to government size. As a result, the public sector may be more productive when it is small.

Pevcin (2004) studied 12 European nations in the period between 1950 and 1996 to validate the presence of the Armey Curve-described connection. His findings indicate that the Armey Curve reaches its peak, which represents the optimum level of government spending, around 40% of gross domestic product. The results are very similar across estimate approaches, with a fixed effect model producing 36.56% as a result and an error correction model producing 42.12%. In 1996, overall government spending in the sample was 52.20% of GDP on average. As a result, the size of the government exceeded the ideal level.

To summarise, the diverse nature of the empirical findings suggests that determining a single optimal size of public spending that applies to all countries is impossible. Each country has its own ideal level, which is impacted by a number of factors such as economic growth, the presence and effectiveness of market economy institutions, the efficiency of the public sector, and demographic preferences. In summary, research reveal that governments are bigger than they need to be. The appropriate size of government, on the other hand, remains difficult to estimate and cannot be forecasted with precision. According to the evidence, smaller governments are more effective, and the ideal government size is likely to be less than what is now observed. In addition, the ideal level reached is most likely influenced by historical data, and the time period examined may influence the results (Ekinci, 2011).

The crowding-out effect is another factor that contribute and can be used to explain the decreasing section of the Amey curve.

Government generates this effect in two ways:

i. When increasing its spending, government causes an increase in the money demanded and, since money supply is fixed, there will be a rise in the nominal interest rates, thus borrowing becomes more expensive for private investors. Consequently, private investment diminishes as money to be borrowed by private

investors for investments in businesses become more costly. In particular, Friedman (1978) referred to this situation as transaction crowding out. Hubbard (2012), on the other hand, affirmed that the effect can vary depending on who holds government debt. Specifically, he highlighted that central bank-held government debt does not crowd out private investment because this is a natural process for central banks in developing economies to maintain price stability.

ii. Additionally, the bigger the role of government in the market, the lower private investors are willing to invest within that market for two reasons. First of all, government's presence may give the perception of a market with less profit potential. Secondly, private investors may find difficult to compete and offer the same degree of subsidies or incentives that government can provide to certain industries on more favourable terms (Karlson, Sandström, & Wennberg, 2020).

The crowding-out effect grows more than proportionally with the government dimension because the welfare state reduces entrepreneurs' profitable operations by increasing their opportunity costs. A systematic crowding-out effect is another cause which arises because public spending implemented to correct market failures deprives economic agents of some solutions (such as market prices and competition in the market process) that, on the contrary, a free-market process would have discovered.

Elmendorf and Mankiw (1999) explained how government debt, thus decreasing national savings, will crowd out domestic or net foreign investments using and equalling the national income identity to the national output. Especially, they argued that if the Ricardian equivalence theorem didn't hold, which stated that variations in government spending will be offset by changes in private sector actions so that the overall effect on aggregate demand will be nil, then if the government raises its public debt by either lowering taxes or increasing government expenditure while keeping the other constant, either domestic or net foreign investment must decline to compensate.

Erden and Holcombe (2005) evaluated the interplay of public and private investment in emerging and advanced economies, concluding that while public spending complements private investment in developing economies, the effect was inverse in advanced economies. According to the authors, the State can provide the necessary infrastructure facilities in emerging countries, thereby stimulating private investments, whereas the public sector in developed economies is already large and may compete with the private sector.

2.3 How venture capital works

As private investors, venture capital firms are highly impacted by the crowding-out effect. Venture capital funds pool money from institutional investors, corporations, and affluent people and invest them in the equity of private, potentially high-growth technology companies (Armour, 2004). This is an especially important source of funding for high-risk technology start-ups that do not have access to the debt capital market. Given the technology-driven nature of their operations and the lack of an established history, as well as their reliance on intangible or firm-specific assets that cannot serve as collateral, these firms are prone to experiencing significant challenges in obtaining external funding due to the potential for adverse selection and moral hazard issues (Berger & Udell, 1998).

According to the EC/OECD (2017) research, equity financing is the preferred method of giving innovative enterprises financial access across OECD countries.

According to Gompers and Lerner (2001a), VCs are regarded as the main driver of funding for pioneering start-up companies. In another study, Gompers and Lerner (2001b) suggested that VC investments in an enterprise were the certification of the quality of the funded company to third parties, such as workers, customers, and partners.

In return for the high risk that VCs take by investing in smaller and less mature companies, they receive minority equity ownership and influence over some strategic company decisions: a compromise that start-ups are willing to accept in exchange for funds that would otherwise be impossible to obtain. As a matter of fact, Rosenstein finding (1988) demonstrated that venture

capitalists are far more active in their investments than outside shareholders in public firms. Fried and Hisrich (1995) labelled VC as “relationship investor”.

Venture capital firms pool money from investors similarly to a fund. In particular, VCs raise funds from a wide range of sources, including institutional investors, endowments, and high-net-worth individuals, and then use the funds to make equity investments in businesses.

VCs typically assist with a variety of tasks such as technical knowledge, networking opportunities, so introduction to potential clients, marketing, and business development. Gorman and Sahlman (1989) discovered that senior partners in VCFs spend 60% or more of their time on post investment activities and contribute to ventures through funding, strategic and operational planning, management hiring, and networking. According to MacMillan et al. research (1989), VCs consider strategic actions to be the most important. Fiet (1995) viewed face-to-face post investment interactions as an attempt to manage agency risks.

On the other side, entrepreneurs prefer financial assistance only prior to investment, but, after the investment, they consider active, non-financial assistance as having the most value added (British Venture Capital Association, 1992). Furthermore, Barney et al. (1994) concluded that, unless the entrepreneur is open to VC assistance, no value can be added by VC involvement. In fact, Chemmanur et al. (2011) asserted that, at any point in time, the overall efficiency of VC-backed firms is greater than that of non-VC-backed firms.

Finally, VCs contribute to the managerial professionalization of their portfolio firms by helping them to hire external managers, implement stock option plans, and revise human resource rules (Hellmann & Puri, 2002).

When speaking of venture capital, it is useful to reflect on the fact that it is capital that enables the translation of new ideas into enterprises, that allows the first development paths to be taken and that generates innovative processes that can sprinkle the entire entrepreneurial system. In other words, venture capital is a real growth factor.

Typically, a venture capital firm is organised as a limited partnership, with the fund’s investors, called limited partners (LPs), providing the money and with the VC firm acting as the general partners (GPs). The general partner is in charge of making investment decisions and running the fund on a daily basis, while the limited partners provide capital and bear the risk of the investments.

The general partner is typically made up of a small group of investment professionals, including partners and associates, who have prior experience in venture capital, start-ups, and the industry in which the fund is concentrated. They are in charge of revealing potential investment opportunities, undertaking due diligence, negotiating, and structuring transactions, and assisting portfolio companies in growing and succeeding.

On the other hand, limited partners typically include institutional investors including retirement funds, endowments, foundations, and high-net-worth individuals. They provide the fund's capital and receive a return on investment if the fund is successful. They also have limited influence over the fund's investment choices and rely on the expertise of the general partner to generate returns.

Typically, the fund has a life between 10 to 12 years. General partners require management fees (typically GPs call 2-2.5% of fund amount annually) to fund administration (i.e., salaries, operations, etc.).

Limited partners receive all profits from exits until 100% of committed capital plus interest is earned. Thereafter, general partners receive 20% of profits.

VCs' investment process consists of five phases:

i. Screen opportunities.

   A market research is conducted to scan and map potential investment opportunities. This is the procedure for locating potential investment opportunities. Deals are typically found by VC firms through a range of sources, including industry contacts, entrepreneurs, angel investors, and other VC firms. As the next phases will involve a close relationship with the selected start-ups, VCs will typically search for companies to operate in a limited geographical area. Mason and Harrison (1992) assumed that venture capital firms may limit the effective geographical area in which they invest to within a one- to two-hour radius from their office. In particular, Sapienza and Gupta (1994) discovered there was the need of face-to-face interaction the more the venture faced uncertainty.

ii. Initial screening and meeting.

After identifying potential opportunities, the VC firm will conduct preliminary screening to determine if the opportunity meets the fund's investment criteria. Typically, this process entails evaluating the company's business plan, financials, and management team. In particular, first meetings take place to check chemistry evaluating compatibility and potential working relationships with the company. As a matter of fact, VCs test start-ups relationships by frequently visiting and talking with company management (Jeng & Wells, 1997). A positive chemistry check does not guarantee an investment because other factors such as the strength of the business model, market opportunity, and financials will all be taken into account in the final investment decision. A negative chemistry check, on the other hand, may indicate that the VC firm and the start-up are not a good fit, and that the investment will not benefit either party. Based on this finding, Colombo et al. (2007) concluded that high-tech firms formed by groups of people were more likely to get venture capital funding than those founded by a single person, emphasizing the significance of team makeup and collaboration in high-tech company success, particularly in terms of getting external finance.

iii. Test for a company to return the whole fund.

If a start-up passes the initial screening and meeting, a more through due diligence will be performed by the VC firm to understand if the company has the potential to become billions-worth investment. According to Fenn et al. (1995), just 1% of enterprises who submitted business proposals to venture capital organisations were funded.

iv. Negotiation and structuring.

If the due diligence process is successful, the VC firm will begin negotiating the terms of the investment with the company. This procedure entails determining the ownership percentage, the company's valuation, and the rights and obligations of the parties involved.

v. Investment committee and closing.

At this point, all the team members should agree on the deal, which is passed to the investment committee for closing the deal. Once an investment decision has been made, venture capitalists usually disburse funding in stages.

VC funds follow a power law curve rather than a normal distribution. When the distribution of returns is heavily skewed, the result is a power law curve. Simply put, a small number of firms capture a significant portion of industry returns.

According to Horsley Bridge, which is regarded as one of Silicon Valley's oldest venture capital firms, for the hundreds of VC funds in which they have invested, approximately 6% of investments representing 4.5% of total investments generated 60% of total returns. According to Gompers (1995), just 22.5% of 794 VC investments made for thirty years successfully went public, the channel through which fruitful VC investments are often exited.

Similar findings were produced in Huntsman and Hoban's (1980) study of the returns on 110 investments made by three VC firms. One out of every six investments was a total loss, while the remaining 45% were either losses or merely broke even.

2.4 Venture capitals' role within the innovation machine

The expansion of the venture capital sector has frequently been thought to be a possible solution to the small firm funding gap problem.

De facto, VC's "raison d'être" is to deal with industries where knowledge is critical and to be specific actors within the financial market who develop expertise in dealing with asymmetric information circumstances (Amit et al., 1998). As Bottazzi and Da Rin (2002) highlighted, VC investors often concentrated on particular sectors, gaining context-specific screening capabilities as a result of their industry specialty, which allowed them to appropriately appraise the commercial worth of entrepreneurial proposals and the entrepreneurial talent of the proponents (Chan, 1983). Furthermore, an additional protection level is added by VC in order to shield their capital against opportunistic entrepreneurial activity and to generate powerful incentives for them, by giving, for instance, the money that has been committed in chunks (i.e., stage financing) as the firm accomplishes pre-established milestones (Kaplan & Strömberg, 2003; Sahlman, 1990). VC investors utilize this staging mechanism to collect information and oversee the advancement of their investments, while also retaining the flexibility to withdraw if they become aware of unfavourable future prospects. VC investors learn about the management team, product, and market of the funded firm after the initial money injection (Ferrary, 2010). Consequently, Gompers (1995), and Tian (2011) explained that there is a lower chance of a second round of funding if it is discovered that there is unfavourable information about the company's prospects.

But, according to Hall and Lerner (2010), VCs' method of addressing informational asymmetries by thoroughly analysing organisations before providing financial support and monitoring them subsequently may close the financing gap. Moreover, in some circumstances, due diligence costs might not justify the potential returns of a successful investment, making VC investors reluctant to invest, not solving the funding gap issue (Martin, Berndt, Klagge, & Sunley, 2005).

According to Busenitz et al. (2005), equity gap is the result of market failure caused, for example, by information asymmetry problems since entrepreneurs have more understanding and knowledge of the technology and the market, particularly when they are new, than potential investors. Conflicts may arise as a result of the agency relationship between the VC investor and the entrepreneurs of portfolio firms (Gompers & Lerner, 2001b). In practice, entrepreneurs

and VC investors may have different strategic objectives, and conflicts may divert entrepreneurs' time and focus away from the search of fresh opportunities. The necessity for VC investors to review managerial choices may result in increasing bureaucracy and formalisation of decision-making procedures, restricting the organization's flexibility and capacity to grab economic opportunities quickly, even without conflicts arising. (Grilli & Murtinu, 2014b). Besides that, because VC investors are skilled investors, Ueda (2004) recognised the possibility that they may be able to seize entrepreneurs' original company ideas and exploit them even when they are not present, therefore the accompanying appropriability risks may lead entrepreneurs to take actions that are adverse to business growth in order to safeguard their firm's technological expertise.

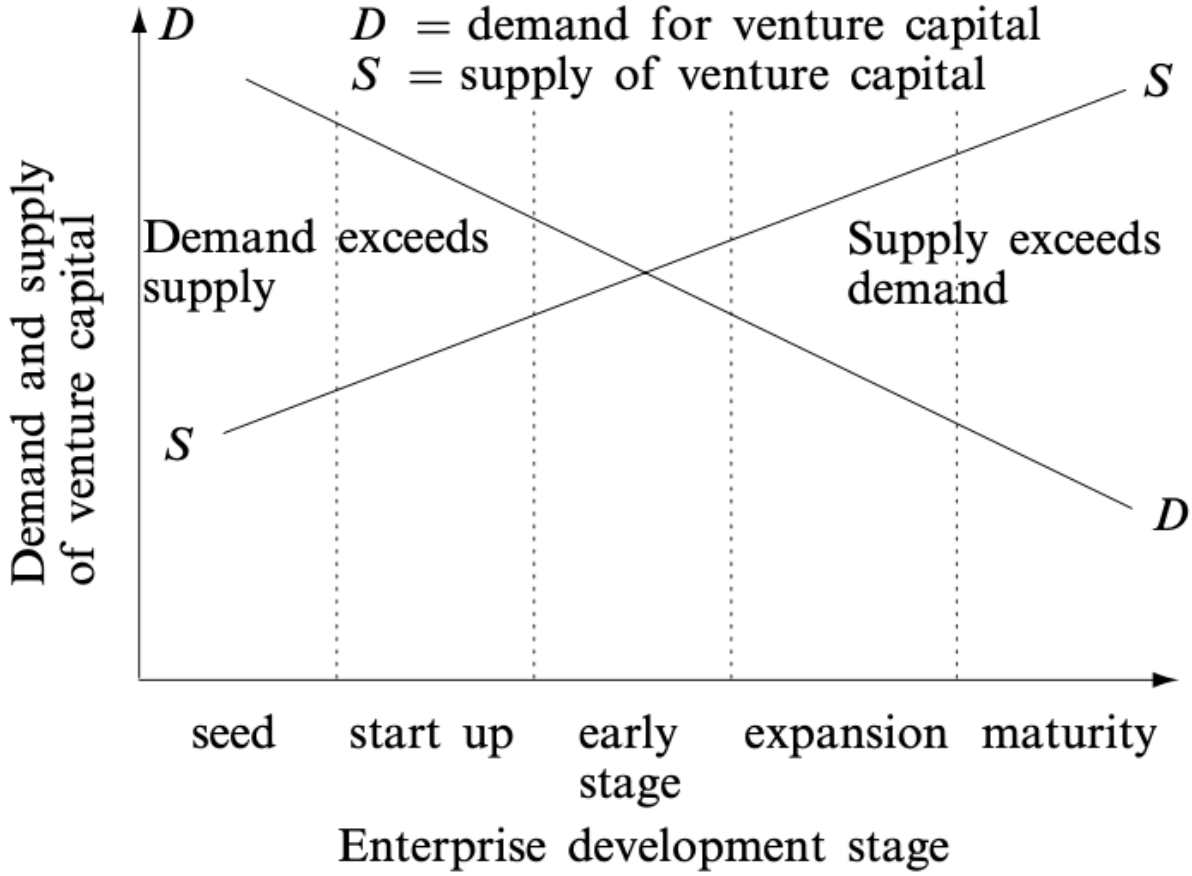
Consequently, a positive impact of VC on start-ups is not something that can be taken for granted.

Carpenter and Peterson (2002) identified the young high-tech firms as the most damaged by information asymmetry concerns, since such ventures are risky, with high failure rates and uncertain financial returns, and VC due diligence process not always bridge this information gap. A study conducted by the Bank of England (2001) reflected how British VCs tend to prefer large established companies to new high-tech start-ups, and this was justified by annual rate of returns which are usually higher for later stage investments.

Birley, Leleux, and Muzyka (1996) observed that venture capitalists frequently must choose between investing in high-risk, high-reward enterprises and investing in more mature, low-risk companies with more reliable returns.

The presence of such a disparity between the demand for and supply of venture capital can be graphically depicted (figure 2, based on Aernoudt, 2003).

Figure 2.4.1 - The disparity between demand for and supply of VC



Source: Aernoudt, R. (2003). Small and medium sized enterprises, in Private Finance and Economic Development: City and Regional Investment. OECD, Paris pp 113-24.

Start-ups especially requires VC funds during the early development phases, where the risk is at its highest, the pay-back period is uncertain and not near, and there is information asymmetry, consequently the access to bank finance and capital markets is limited and expensive. In this respect, Jensen and Meckling (1976) demonstrated how information asymmetry negatively impact investor willingness to provide capital.

Governments intervene in venture capital markets when funding gaps' necessity are perceived because high-tech start-ups are believed to make a significant contribution to both innovation and economic development (Cosh and Hughes, 2003).

Recently, Da Rin et al. (2006) explained how economic policy has given great attention to the development of a venture capital market that offers robust support for early-stage and high-tech businesses. In their study, Da Rin et al. (2006) discovered that European policies have been effective at shifting venture capital markets' composition in favour of projects with less collateral, particularly early-stage projects and projects in high-tech industries.

Kokalj et al. (2003) observed that, there has been significant criticism in the United Kingdom regarding the allocation of venture capital funds, with many claiming that the funds have being directed towards less risky investments rather than riskier, early-stage seed and start-up, initiatives.

Likewise, in Germany, the authors noticed the absence of sufficient VCs funding both in early-stage start-ups and in mature companies which need funds to expand.

Another dimension of complexity can be added if the regional dimensions of venture capital is considered. In fact, Norton (2001) contended that the emergence and rapid growth of distinct spatial clusters of high-technology firms in the US was inextricably linked to the progression of a large and successful VC market.

Governments around the world have been attempting to mimic the dissemination and success that venture capital has attained in the United States as economies become increasingly dependent on innovation and entrepreneurship for achieving continuous growth (Da Rin, Nicodano, & Sembenelli, 2006).

Specifically, the European Commission (1998) referred to the United States situation to spotlight how the lack of large regional high-tech clusters in Europe was hindering the demand for and the supply of VCs. Roure, Keeley, and Van der Heydew (1990) observed that, in the 1990s, the European VC industry was still in its early stages and faced various problems, including a lack of an established market for initial public offerings, a scarcity of experienced entrepreneurs and managers, and a lack of a consistent regulatory framework. They contend that, in comparison to the United States, the European industry was characterised by a larger emphasis on government assistance and a more conservative investment style. In particular, Wooldridge (2009) highlighted that Europeans were more sceptical of businesses and had harsher attitudes towards bankruptcy. Moreover, according to Wooldridge's (2009) findings, commencing a start-up in Europe presented difficulties due to the fragmented market structure,

the cumbersome patent system, and the ties between universities and industries. Europe struggled with its failure to translate scientific expertise into profitable endeavours, which appeared to be caused by impediments to start new businesses and reap significant financial rewards from them, rather than a lack of capital or appealing technology opportunities (Da Rin, Nicodano, & Sembenelli, 2006).

Oppositely, Ooghe, Manigart, and Fassin (1991) believed that the VC market in Europe had grown significantly over the last decade, with both the number of active VC firms and the amount of money under management increased significantly, although they recognised that European venture capital industry was still to significantly small compared to US' one. More in depth, the authors underlined how improvements in the regulatory environment had aided the industry's expansion.

In the paper, Ooghe et al. (1991) recognised two key regulatory variations. Firstly, several European countries, including the United Kingdom and France, established tax breaks for venture capital investment in the 1980s and 1990s, according to the authors. These incentives included tax advantages for individuals and institutions investing in venture capital funds, as well as capital gains tax exemptions from VC investments. According to the authors, these tax breaks made VC investment more appealing to institutional investors and increased the availability of cash for VC firms. Secondly, the authors stated that in many European nations, legislation historically limited the types of assets in which institutional investors, such as pension funds and insurance companies, could participate. However, many of these limitations were loosened in the 1980s and 1990s, allowing institutional investors to invest a higher amount of their portfolios to assets such as VC funds. According to Ooghe et al. (1991), rising institutional investment contributed to boost the amount of funds available to VC firms in Europe.

Concerns have been raised that less prosperous European regions were at a disadvantage when it pertained new business growth backed by venture capital. The importance of venture capital in economically disadvantaged areas lies in its potential to stimulate and sustain the growth of new small businesses and innovative activities.

According to Lerner (2002), a critical challenge for these laggard regions was the low creation of new and small businesses, particularly high-tech businesses. This was due in part to a lack of available risk capital, which has resulted in an equity gap due to the concentration of venture capital in more prosperous regions (Bottazzi & Da Rin, 2002). Along with this, La Porta et al.

(1997) uncovered evidence to support the claim that the legal environment influences the size and width of capital markets across nations, with those with poorer investor protection having smaller and narrower capital markets.

In addition, Cruickshank (2000) observed that there was an evident discrepancy between the needs of firms seeking small-scale equity investments and the availability of such investments. Lonsdale (1997) claimed that, assuming transaction costs associated with VC deals slightly change with deal size, small projects are penalized by the deal cost/deal size ratio and, therefore, small projects will be the segment most impacted by an equity gap.

Furthermore, Martin et al. (2005) tested and confirmed that the geographical distribution of VC investment is influenced by the locational geography of the VC business itself. The existence of a significant concentration of venture capital firms in a particular location can create a local demand for venture funding, leading to the establishment or relocation of additional venture capital firms in that area.

Colombo, Grilli, and Verga (2007) have even noted that this difference can be found within the same country, as the bulk of the businesses in their sample were located in northern Italy, specifically Lombardy and Emilia-Romagna, which are known for their strong industrial and innovation potential, showing that there may be geographical differences in the availability of funding and other resources for high-tech businesses in Italy.

As a consequence, many OECD countries' policy initiatives have intensified in recent years to help start-ups and VCs (Wilson & Silva, 2013). Martin et al. (2005) recognized there were strong grounds for believing that some sort of policy intervention was required if venture capital markets were to emerge and prosper in areas that were not close to major venture capital hubs and had few local venture capital companies.

The challenge arises when attempting to establish substantial local VC markets in areas that lack major financial institutions or burgeoning clusters of innovative, new enterprise-based growth, as well as the range of specialized business, legal, advisory, and other services that small and medium-sized enterprises and a robust local venture capital market necessitate. European Commission (2009) recognised that VC market was fragmented and insufficiently innovator friendly.

Government-backed VCs are also implemented with the goal of creating and empowering job, as local and regional development can be achieved through employment growth (Audretsch, 2002). However, studies conducted in European countries by Grilli and Murtinu (2014a) and in Australia by Cumming and Johan (2014) revealed that GVCs effect on job growth was empirically negligible.

Also, Manigart (1994) discovered that the number of existing organisations in the VC industry was crucial in comprehending the formation of new organisations within the same sector.

Without government engagement, investment opportunities in underserved areas may go unexploited. GVC initiatives might be helpful in facilitating certain issues in remote and economically disadvantaged places where there is no indigenous VC business (Colombo, Cumming, & Vismara, 2016).

Florida and Smith (1993) argued that public intervention should not limit to just set up a publicly funded regional VC fund, instead, it should be aligned and incorporated in conjunction with other elements of municipal economic strategy, particularly those aimed at fostering the creation of innovative new businesses. On top of that, Alperovych et al. (2020) recognised that underdeveloped regions should be supported by national GVC policies, rather than local GVC investments, to exploit scale and learning effects, due to the possibility that venture capital investors may be scarce locally and challenging to entice from more developed regions.

Leleux and Surlemont studies (2003) revealed that bigger sums of money were invested in the industry as a whole as a result of public involvement, which may indicate that government helped to grow the market and made it more appealing to private investors.

In this field, government policies can be categorized into two types: those that provide direct funding to start-ups, and those that stimulate the entry of external capitalists (Lerner, 1998).

In fact, public policies regarding VCs can be divided into two categories, legislation and investment programmes.

Capital gains taxes, for instance, are usually regarded as crucial incentives for encouraging VC markets (Jeng & Wells, 2000), as venture capitalists invest with the intention of exiting and reaping the capital gains (Carpenter & Peterson, 2002).

Therefore, a reduction in the capital gain taxation can significantly increase VC efforts. As a matter of fact, Poterba (1989a, 1989b) demonstrates that venture capital fundraising in the

United States surged from $868.2 million in 1977, when capital gains tax rate was 35%, to $2.1 billion in 1982, after a reduction of the capital gains tax rate to 20%.

Gompers and Lerner (1998) also recognized other legal mechanisms that have boosted VC markets, such the revisions to legislation in the United States in 1979 that expanded the ability of pension funds to provide capital to venture capital funds.

According to Jeng and Wells (2000), IPOs were the most important driver of VC investment, therefore the likelihood of a successful IPO was usually regarded as critical for the development of the VC industry (Black & Gilson, 1998). Brander et al. (2008) suggested that VCs may increase competitiveness as they were linked to a higher likelihood of an IPO on a senior exchange, when compared with GVCs which were associated with IPOs on junior exchange.

Oppositely, when compared to VC-backed enterprises, Australian government-backed companies resulted in a higher percentage of publicly traded investments as well as a higher market value of such investments. (Cumming & Johan, 2014).

When there are stock markets targeted at entrepreneurial businesses that offer lucrative exit prospects and when the capital gains tax rate is reduced, investing in early-stage and high-tech enterprises tends to rise (Da Rin et al., 2006).

De Meza (2000) argued that if governments intervene, they must be able to overcome information gaps and select the most promising enterprises, or their efforts will be counterproductive.

Lerner (1999) presented the case and the success of the Small Business Innovation Research (SBIR) program, launched by the United States Business Administration. According to the article, government rewards to private parties certify the company's excellence, assist the company in establishing itself, and allow the company to seek additional funding. In particular, the SBIR program, with more than $21 billions of investments, is the world's largest government support programme for venture capital. Intel Corporation, Apple Computer, and Federal Express are among the most successful cases of companies supported by this program. In this study, Lerner (1999) showed that businesses in the early stages of development that received support from SBIR experienced significantly faster rates of expansion compared to firms that did not receive SBIR funding.

In 1997, similarly, the Australian government launched the Innovation Investment Fund (IIF) programme, which, according to Cumming findings (2007), were statistically and economically significant in promoting the establishment and growth of the Australian VC industry. Furthermore, Cumming and Johan (2014) found that time to IPO, market capitalization, patents, employment, and R&D have been facilitated by the Australian government subsidized funds more than by VC funds.

According to Brander et al. (2014), economies that receive higher GVC investment have greater VC financing per business and more VC-funded firms, showing that GVC money supplements rather than replaces VC finance.

Hood (2000) provided additional evidence of crowding-in effects by demonstrating that the Scottish public venture capital programme was succeeded by the development of new VC funds.

Colombo et al. (2016) explained how GVCs might generate a crowding in effect on the development of VC markets due to signalling effects, as they selectively provided money to underfunded early innovative enterprises, conveying to private sector investors their high potential.

In this respect, VC companies have been proven by Hall and Hofer (1993) to employ external assessments to enhance decision-making when evaluating offers. Takalo and Tanayama (2010) explained that government people responsible for reviewing proposals for investment must make investment decisions that are not at random in order for GVCs to be received and used by VCs firms as a screening tool, just as they have to choose companies with the potential to be profitable for VC firms if they are funded.

There are various reasons to think that GVCs are capable of spotting viable businesses when they examine the funding ideas presented. In the first place, Lerner (1999) pointed out that it is probable that government can efficiently vet such ideas.

For example, Guerini and Quas (2016) explained how Innovation and Technology Ministry's GVC investors may rely on experts who have extensive knowledge of the technologies and businesses that have the best prospects.

Del-Palacio et al. (2008) pointed out how governments may exploit universities entrepreneurship centres as a source of knowledge.

Moreover, Cumming et al. (2014) suggested that due diligence can be carried out more successfully by investors who had a variety of backgrounds, which could be expected by the

combination of VCs and GVCs investors. As a result, VC investments in GVC-backed companies ought to have a somewhat higher chance of success than venture capital investments in non-governmental VC-backed businesses.

Second, due to worries about appropriability (Ueda, 2004), entrepreneurial enterprises may baulk when potential investors ask for sensitive and confidential information, which is required to evaluate their investment initiatives. The lack of the comparable appropriability threat from GVC investors, however, reduces information asymmetries and streamlines the GVC review procedure.

Lastly, free-riding issues may encourage GVC investors more than VC investors to scrutinise investment proposals. Because other private investors could gain from their efforts, VC investors would be hesitant to undertake expensive screening processes. In fact, Guerini and Quas (2016) revealed that existing data suggested that GVC investors spent more time vetting proposals than private investors in this regard. Guerini and Quas' findings were confirmed by a survey prepared by Luukkonen et al. (2011) and submitted to European VC investors, the results of which showed that GVC investors asserted that they take more time than VC investors to assess proposals and choose investment targets.

Colombo et al. (2016) highlighted how the Jumpstart Our Business Startups (JOBS) Act, an American legislative initiative, removed listing limitations to rising enterprises, fostering economic expansion by facilitating the access to (public) capital markets.

However, the authors recognised that GVC investments were often used to achieve broader policy aims, including the creation of substantial social benefits or localised public benefits (e.g., job creation or economic growth in a particular region or industry), which resulted in decisions that weren't solely influenced by financial objectives and investments that didn't provide a suitable return on investment, typical factors of investors in the private sector.

On the other hand, Brander et al. (2008) were doubtful about GVC investors' ability to select successful start-ups, either because they lacked the knowledge to do so or because political incentives may corrupt investment tactics.

Public leaders may occasionally make investments in businesses based on their chances of success, regardless of the requirement for government funding, according to Cohen and Noll (1991), and Wallsten (2000b). Due to the likelihood that public programmes will draw the finest

initiatives and leave just "lemons" for private investors (Leleux & Surlemont, 2003), resources will likely be misallocated, and more impediments may be put in the way of private venture capitalists.

Furthermore, special interest lobbying regularly influenced politics and government funding at the cost of citizens and the general public (Niskanen, 1975).

Bertoni et al. (2014) showed that, despite European governments' efforts to plug the early-stage investment gap left by VC investors by establishing GVC funds and investing in seed-stage enterprises, governments have been unable to attract VCs to these companies.

Moreover, using the Canadian example, Brander et al. (2008) found evidence of crowding out and showed the better performance of VC-backed enterprises compared to the enterprises supported by the government. In particular, the authors highlighted how VCs were more likely to have successful exits and tended to generate higher value if the exit was successful.

In a study conducted on Belgium VC market, Alperovych et al. (2013) revealed how profitability and growth have been significantly reduced by the equity presence of public investors in Belgian start-ups with respect to private investors. According to Guerini and Quas (2016), the likelihood of a start-up receiving a first round of VC funding was three times higher if this start-up had also previously received funding from GVC. Moreover, Guerini and Quas (2016) found that enterprises chosen by the governmental venture capital firms and given an initial stage of venture capital investments were at least equally likely to receive a second round of VC or to experience a successful exit as other VC-backed businesses.

Oppositely, Vanacker et al. (2014) claimed that businesses funded by GVC investors were more unlikely to raise further equity investment than those sponsored by VC investors.

Cumming et al. (2014) expressed concerns because GVC programmes may be ineffective at monitoring, nurturing, and mentoring investee firms. Leleux and Surlemont (2003) highlighted that public fund administrators, as civil servants and government employees, may lack the knowledge and commitment required to identify and assist entrepreneurial enterprises.

According to Knockaert and Vanacker (2013), GVC-backed enterprises may underperform due to a lack of engagement in mentoring for their portfolio firms, as GVC managers were less involved in value-added activities than VCs. Cumming and MacIntosh (2007) identified an imbalance between the amount of capital being managed and the number of managers overseeing it, a reduced ability to exercise control and enact changes in invested companies due to minority stakes, along with limited time available for thoroughly screening potential

investments because of pressure to quickly reinvest capital as further reasons for underperformance of GVC-backed enterprises compared to VC-backed ones. On this subject, Alperovych et al. (2020) suggested that governments should establish funds focused on specific industries to become specialized and gain knowledge of a particular sector.

Cumming and MacIntosh (2006) pointed out how Canadian government policies have crowded out VC investments. As supporting evidence, the authors mentioned the Small Business Financing Program supplied by Canadian government, which provided government loans to small businesses at a cost lower than the funding supplied by VCs, diminishing the demand for the latter. The authors also discovered that the crowding out effect is more severe in industries that receive a lot of government support.

As part of investment programmes, governments provide support through GVCs, which must collaborate with, rather than compete with, VC funds in markets where a recognisable market failure in the financing of companies exists (Lerner, 2002).

3. Methodology

3.1 Research questions

In recent years, young and innovative start-ups have faced several challenges in obtaining seed and early-stage capital. Banks have grown less willing to lend money to start-ups in the aftermath of the financial crisis, while venture capital companies have become more conservative and are primarily focused on later stage investments. Although angel investors have grown more visible and collaborative through networks and groups, they still face financial hurdles. The financial system is critical in fostering innovation and progress. It becomes simpler to offer capital for entrepreneurial projects by establishing regulations and changes in financial institutions and marketplaces. According to research, start-ups and small to medium-sized organisations have higher challenges in acquiring finance and overcoming institutional barriers than bigger firms (Beck, 2007). These impediments may occur as a result of complicated regulatory frameworks that may have hidden disincentives for both young creative enterprises and investors.

As a result, some OECD governments have sought to bridge the financing gap and address market inefficiencies by giving aid to the seed and early-stage market.

After an extensive literature review, it is clear that the debate is centred around whether a government should intervene to influence the level of venture capital investments in a country and, eventually, how it can effectively attract investors and establish a long-term thriving ecosystem for start-ups.

On the one hand, over the past years, a large number of researchers and economists have believed that the venture capital market should operate freely, and they have suggested that government intervention would necessarily entail crowding-out of venture capital investors.

In fact, according to Brander et al. (2008), government cannot operate within venture capital markets due to the dearth of knowledge of the industry, which cause a crowding-out effect of private venture capital investors.
This point of view has been taken to extremes by Ludwig von Mises (1949), Malthus (1798), and Rothbard (1970) who have sentenced governments as always harmful for the economy and the market.

On the other hand, several studies and research have demonstrated that the level of venture capital investments in a country can be influenced by government actions. In particular, Mazzucato (2015) stressed the important role played by governments in fostering innovative start-ups. On top of that, Colombo et al. (2016) explained how government's investment in start-ups are perceived as a symptom of investment quality by venture capitalists, generating a crowding-in effect.

Therefore, considering the debate, the side of this paper is in favour of those who believe that the government has an important role to play within the venture capital industry.
However, it has been acknowledged that the complexity and risk of a start-up, as well as information asymmetry, require the creation of a flourishing ecosystem under certain conditions and factors influenced by governments, rather than just money supply.
In particular, this paper aims to build on the papers discussed in the literature review, where the need of government intervention was recognized, but those papers had a strong limitation, as a guidance to government on what factors influence venture capital investments and in which direction these factors should be directed to establish a thriving ecosystem for start-ups and venture capital investors is missing (Sapienza, Manigart, & Vermeir, 1996; Grilli, & Murtinu, 2014b; Colombo, Grilli, & Verga 2007).
Moreover, this paper, unlike previous ones that were focused only on just one particular factor and action (Da Rin et al., 2006; Ooghe et al., 1991; Poterba, 1989a, 1989b; Tirole, 1988), wants to present a comprehensive view of multiple factors, that can give governments more degrees of freedom on which factors to intervene.

3.2 Sample selection

In order to carry out this research, three steps were required:

i. Identification of a set of countries.
ii. Finding a metric of VC investments over a chosen time horizon.
iii. Selection of appropriate factors as independent variables.

3.2.1 Identification of a set of countries

This paper wishes to have a global impact and utility, and, for this reason, the analysis needs to include a significant range of countries around the world.
Rather than selecting a few countries per continent without reasoning behind it, I decided to consider:

i. 32 OECD member countries.

   - Australia
   - Austria
   - Belgium
   - Canada
   - Czech Republic
   - Denmark

- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Ireland
- Israel
- Italy
- Japan
- Korea Republic
- Latvia
- Lithuania
- Luxembourg
- Netherlands
- New Zeeland
- Norway
- Poland
- Portugal
- Slovak Republic
- Slovenia
- Spain
- Sweden
- Switzerland
- United Kingdom
- United States

ii. 2 key countries partner of OECD member countries.

- Russia
- South Africa

iii. 2 perspective member countries which have requested OECD membership.

- Bulgaria
- Romania

The decision to focus on Organisation for Economic Cooperation and Development (OECD) economies is based on their strategic importance, as member countries account for more than 60% of the world's GDP, resulting in a leading position in international trade and investment. They are, indeed, key drivers of the global economy, and their policies and actions have far-reaching consequences for other nations. Many of the world's most powerful multinational firms have their headquarters in OECD nations, and they play an important role in influencing global supply networks and investment flows.

Furthermore, many OECD economies wield political power on a global scale, fostering economic growth and prosperity. For example, OECD nations are important foreign assistance givers and contribute to international organizations such as the United Nations, the World Bank, and the International Monetary Fund. Furthermore, they have a substantial influence on international trade rules and regulations, which can have a big impact on global economic activity.

Furthermore, OECD economies are at the cutting edge of innovation and technology, with many of the world's premier corporations and research institutes headquartered in these nations. As a result, they have a significant impact on the direction of technical growth as well as the creation of new goods and services. The OECD promotes policies that support entrepreneurship, research and development, and the commercialization of innovative technology, all of which serve to create innovation.

Overall, the OECD nations play a vital role in shaping the global economy, politics, and social development, and their policies and actions have profound implications for the rest of the globe.

Finally, for more than a half-century, the OECD has been a reliable source of economic statistics and evidence-based policy analysis. The organisation acts as a significant resource for

policymakers aiming to better their economies by offering a venue for governments to exchange experiences, identify effective practises, tackle shared difficulties, and create high standards for economic policy.

3.2.2 Finding a metric of VC investments over a chosen time horizon

After having identifies the set of countries, it was needed to collect data of venture capital investments in those nations. However, given the large number of countries, I found a significant difference in terms of investments in each country, which is influenced firstly by the size of that country. For instance, France's capacity of investment is much greater than Hungary's one, given that France GDP is nearly 10 times Hungary GDP[1].

Secondly, the difference can also be explained by the propensity to venture capital investment of the country in question. In this case, it is useful to mention the difference between Denmark and Norway, two countries geographically close with a similar size, when comparing GDP, and yet two very different levels of venture capital investments: 959.393 millions of USD for Denmark in 2021 against 195.651 millions of USD for Norway in 2021[2].

Hence, in order to have a homogeneous and consistent analysis, I normalised the investments of venture capital in each country by their gross domestic product using the investment in venture capital in a country as a percentage share of GDP, that will be the dependent variable in the statistic model:

$$VC\ investment\ as\ \%\ share\ of\ GDP\ in\ country\ i\ = \frac{\text{VC investment in country i}}{GDP\ of\ country\ i}$$

[1] OECD statistics on gross domestic product: https://data.oecd.org/gdp/gross-domestic-product-gdp.htm

[2] OECD statistics on venture capital investments: https://stats.oecd.org/Index.aspx?DataSetCode=VC_INVEST

The above value has been calculated for a chosen time horizon of 15 years, from 2007 to 2021, considered appropriate for several reasons. For starters, a 15-year time range enables the discovery of long-term patterns. For example, evaluating the success of a certain area over a 15-year period might provide insights into long-term patterns that may not be visible over shorter timescales. These patterns can give useful data for predicting and planning.

Second, selecting a time range of 15 years can assist to smooth out short-term variations in the data. Short-term swings might be caused by seasonal variations, market volatility, and other transient events that do not always reflect the underlying trend. These short-term oscillations may be averaged out by analysing data over a 15-year period, resulting in a more accurate portrayal of the overall trend.

Third, a time horizon of 15 years might be beneficial for planning and forecasting. Many statistically based judgements, such as investment decisions need a long-term view. Analysts may make more accurate forecasts about future trends and plan accordingly by employing a 15-year time horizon.

Finally, a 15-year time frame can represent the economy's cyclical character. Economic cycles, such as the business cycle, are often many years long.

If data is analysed during a short period of time, long-term trends or cyclical patterns may be missed. Short-term variations may also bias the data, making it harder to detect the underlying trend. As a result, it is critical to select a time frame long enough to capture relevant trends and patterns in the data.

When analysing data over a lengthy period of time, it can be difficult to spot changes in trends or patterns that may have happened in recent years. For example, if one compares data from 50 years ago to today, the trends and patterns from 50 years ago may be irrelevant to the current situation. Furthermore, historical statistics may not precisely reflect current market dynamics and economic realities.

To summarise, running statistics over a 15-year time frame can offer a more accurate depiction of long-term trends, attenuate short-term swings, help in planning and forecasting, and capture economic cycles.

3.2.3 Selection of appropriate factors as independent variables

Given the aim of this research of providing a thorough analysis of multiple factors, I decided to use the 12 factors of The Index of Economic Freedom by The Heritage Foundation as The Index provides a comprehensive measure of economic freedom that policymakers, investors, and other stakeholders may use to assess a country's economic climate.
Policymakers, investors, and other stakeholders can use this data to assess a country's economic climate and make educated decisions regarding investments, and other economic activities. Furthermore, The Index provides an objective and transparent measure of economic freedom that governments may use to hold them responsible for their economic actions. Countries with low Index scores may face pressure to alter their policies in order to attract investment and enhance their overall economic performance.
The Index is based on statistics from the World Bank, the International Monetary Fund, and the Economist Intelligence Unit.

The Index bases its assessment of economic freedom on 12 quantitative and qualitative indicators organised into four main categories of economic freedom: Rule of Law, Government Size, Regulatory Efficiency, Open Markets[3].
Each of the 12 factors is rated on a scale from 0 to 100, with 0 representing the worst rarting for that factor and 100 the best.

i. The Rule of Law component examines how well a country's legal system protects property rights, enforces contracts, and ensures that enterprises have a fair playing field. Legal systems that are robust are more likely to attract investment and foster economic

[3] About The Index of Economic Freedom by The Heritage Foundation: https://www.heritage.org/index/about

growth.

The Rule of Law consists of 3 factors:

- Property rights

  In a fully functioning market economy, the acquisition of private property and wealth is a fundamental driving factor for employees and investors. Private property rights must be protected, and an effective rule of law must be in place to allow this. Citizens with secure property rights can be confident in their capacity to engage in entrepreneurial activities, save their money, and make long-term plans because they know their property, assets, and income are safe from unlawful seizure or theft. Property rights, in reality, are a key component in the accumulation of capital for production and investment. Furthermore, contract enforcement is an important component of defending property rights.
  The government's impartial enforcement of private contracts is required to guarantee market fairness and integrity.

- Government integrity

  In a world of social and cultural variety, certain practises that are deemed corrupt in one location may be considered traditional in another. Small informal payments to service providers or government officials, for example, may be seen as a regular type of remuneration, a mark of appreciation for excellent performance, or an illegal form of extortion. While these practises may restrict an individual's economic freedom, their overall influence on the economy is predicted to be modest. While not all of these practises are unlawful in every country or situation, they all undermine the integrity of government wherever they occur.

They are fundamentally inconsistent with the values of fair and equitable treatment that are required for a free and thriving society by giving certain persons or special interests preferential treatment at the expense of others.

The amount to which the government intervenes in economic activity is directly related to the incidence of corruption. Furthermore, official rules or prohibitions in one sector might lead to the emergence of informal or illegal markets in another. A government that imposes numerous burdensome barriers to doing business, such as regulatory red tape and high transaction costs, can, for example, incentivize bribery and encourage illicit and covert interactions that undermine the transparency required for a free market to function effectively.

- Judicial effectiveness

Legal frameworks that work properly are critical in protecting all people' rights from being infringed by others. Judicial efficacy, as a critical component of the rule of law, needs efficient and fair judicial systems that ensure that laws are completely respected, and appropriate legal penalties are taken against infringements.

Evidence from throughout the world shows that having an honest, unbiased, and competent legal system is critical to empowering individuals and promoting competitiveness. An institutional commitment to sustaining and increasing judicial effectiveness is essential in the continual effort to improve the human condition and attain greater prosperity.

ii. The Government Size component analyses the extent to which the government spends, taxes, and regulates the economy. Smaller governments with fewer taxes tend to have more economic freedom because they empower people and enterprises to make their own economic decisions:

The 3 factors of The Government Size are:

- Government spending

  The size, expense, and intrusiveness of government are critical concerns in economic freedom, and the Index assesses them in a variety of ways. Government expenditure can take many forms, not all of which are detrimental to economic freedom. Government expenditure on infrastructure, research, or human resources, for example, might be considered investments.
  However, every government expenditure eventually necessitates greater taxes and imposes an opportunity cost. Excessive government expenditure has the potential to displace private economic activity. Even if government expenditure looks to produce quicker economic development, such growth is typically transitory, distorts market resource allocation, and decreases private investment incentives. Furthermore, resistance to market discipline generally results in bureaucracy, inefficiency, and reduced production.

- Tax burden

  Governments put fiscal costs on economic activity through taxing and borrowing but maximising economic freedom entails allowing people and enterprises to keep and manage a greater portion of their income and wealth for their own profit and use. When the government takes a larger proportion of an individual's income or wealth, it diminishes the reward for economic activity and lowers the motivation to work. Higher tax rates also limit the total amount of private-sector activity, preventing people and businesses from achieving their goals in the marketplace.

- Fiscal health

The budget of the government is one of the most visible signs of how much it adheres to the idea of limited government. The budget outlines where the government will interfere in economic activity and to what extent. Furthermore, it emphasises the government's commitment to effective resource management, which is critical for long-term economic growth and the expansion of economic freedom.

Poor budget management by the government undermines macroeconomic stability, produces economic uncertainty, and eventually hinders economic freedom. While debt financing of government expenditure can contribute to productive investment and economic progress, excessive public debt can raise interest rates, push out private investment, and limit the government's ability to respond to economic crises.

Furthermore, rising public debt, caused by recurrent budget deficits caused by expenditure that primarily enhances government consumption or transfer payments, frequently hinders total productivity development and leads to economic stagnation rather than growth.

iii. The Regulatory Efficiency component assesses the ease with which a country conducts business, taking into account aspects such as business registration, and labour legislation. Regulatory regimes that are efficient and transparent are more appealing to investors and are more likely to encourage economic growth.
The 3 factors that make up The Regulatory Efficiency are:

- Business freedom

The capacity of a person to start and run a business with little or no government involvement is a crucial sign of economic freedom. The greatest impediment to freely executing entrepreneurial activity is the cumbersome and repeated rules. Regulations can raise manufacturing costs, making it more difficult for entrepreneurs to prosper in the market.

While many rules inhibit business efficiency and profitability, those associated with getting business licences frequently stymie entrepreneurship.

Government rules may interfere with routine decision-making or pricing procedures once a firm is running. Countries that implement rules consistently and openly can reduce regulatory burdens by encouraging long-term company planning, whereas countries that apply regulations inconsistently increase regulatory burdens by creating an unpredictable economic climate.

- Labour freedom

Individuals' ability to acquire employment opportunities and engage in labour is a critical component of economic freedom. Similarly, firms' freedom to freely contract labour and dismiss unneeded staff is critical to generating improved productivity and long-term economic growth.

Voluntary exchange is a key tenet in any economically free market, and this holds true in the labour market as well as the products market. The same difficulties arise when the government intervenes in the labour market as it does in other sectors.

Unions frequently play a substantial role in controlling labour freedom in many countries, and depending on the nature of their activity, they can either encourage more freedom or obstruct the effective functioning of labour markets. Onerous labour regulations harm both firms and employees. Inflexible labour standards prevent companies and employees from freely negotiating changes in working conditions, resulting in a chronic mismatch between labour supply and demand.

- Monetary freedom

Monetary independence is contingent on the availability of a stable currency and market-driven pricing. Entrepreneurs require a constant and trustworthy

currency to serve as a medium of exchange, unit of account, and store of value in order to engage in economic activity. Their capacity to develop long-term value or amass money is greatly hampered by a lack of monetary independence. A government's monetary policy may have a major influence on the value of a country's currency. People may rely on market pricing in the future when monetary policy aims to battle inflation, maintain price stability, and safeguard national wealth. They have more confidence in their ability to invest, save, and create other long-term goals.

iv. The Open Markets component evaluates trade freedom, including tariffs, non-tariff obstacles, and investment limitations. Open markets are more likely to attract foreign investment, foster competition, and profit from international commerce. The 3 factors are:

- Trade freedom

  Governments frequently restrict their citizens' ability to participate in international trade as buyers or sellers by erecting different trade obstacles. In today's world, where global supply chains and cross-border production processes are common, businesses require trade policy stability, and any government actions that create uncertainty about future trade conditions can have long-term negative effects on trade freedom.
  The degree to which governments obstruct the free flow of foreign trade has a direct influence on people' capacity to attain economic goals and maximise productivity and well-being. Furthermore, trade restrictions frequently stifle the productive growth of local enterprises by putting advanced-technology items and services out of reach.

- Investment freedom

An open and free investment environment is essential to maximise possibilities for entrepreneurs and promote more economic activity, higher productivity, and job creation. Equity and transparency should characterise an effective investment framework, as should support for all sorts of enterprises rather than just large or strategically significant ones and fostering rather than inhibiting innovation and competition.

Capital mobility restrictions, both locally and globally, hinder economic decision-making, impair effective resource allocation, and lower productivity.

- Financial freedom

An open and efficient formal financial system is critical for maximising entrepreneurial potential and incentivizing economic activity. Individuals and organisations should be able to use this system for a variety of savings, credit, payment, and investment services. A competitive banking environment encourages effective financial intermediation between investors and entrepreneurs.

Markets give real-time pricing information as well as instant punishment for poor judgements. This procedure is dependent on market openness and the veracity of the information made public. An effective regulatory framework ensures both through disclosure requirements and independent audits.

Other financial services, in addition to banks, are increasingly important in raising capital and spreading risk.

Venture capitalists seek substantial returns by investing in creative start-ups and early-stage firms with strong growth potential. Because investing in start-ups implies risks, these investors must carefully examine possible investments to limit their exposure to risk.

The Index of Economic Freedom is a tool that can help venture capitalists evaluate potential investments in various nations. Venture capitalists can gain valuable insights into a country's economic climate by examining factors such as rule of law, property rights, government spending, trade freedom, and business freedom. This allows them to weigh the potential benefits and drawbacks of investing in start-ups in that country.

For example, a country with a strong rule of law and strong property rights protection may be more appealing to venture capitalists because they may be more certain that their investments would be protected. Similarly, a country with high levels of trade and commercial flexibility may appeal to venture investors since entrepreneurs may enter new markets and operate under less stringent rules.

Departing from previous literature, this paper aims to be unique and original in using The Index of Economic Freedom by The Heritage Foundation to try to explain the underlying phenomenon of venture capital investing in a country.

4. Preliminary analysis

4.1 Qualitative analysis of graphs

Before embarking on the formulation of hypotheses and statistical analysis, I carried out a qualitative analysis of the data using some graphs, with the aim of trying to anticipate some results, fill in the zeros, and eliminate potential outliers from the dataset.
On this paper, only the graphs on Italy will be reported as representative of all countries.

Figure 4.1.1 - Italy VC investments as % share of GDP from 2007 to 2021

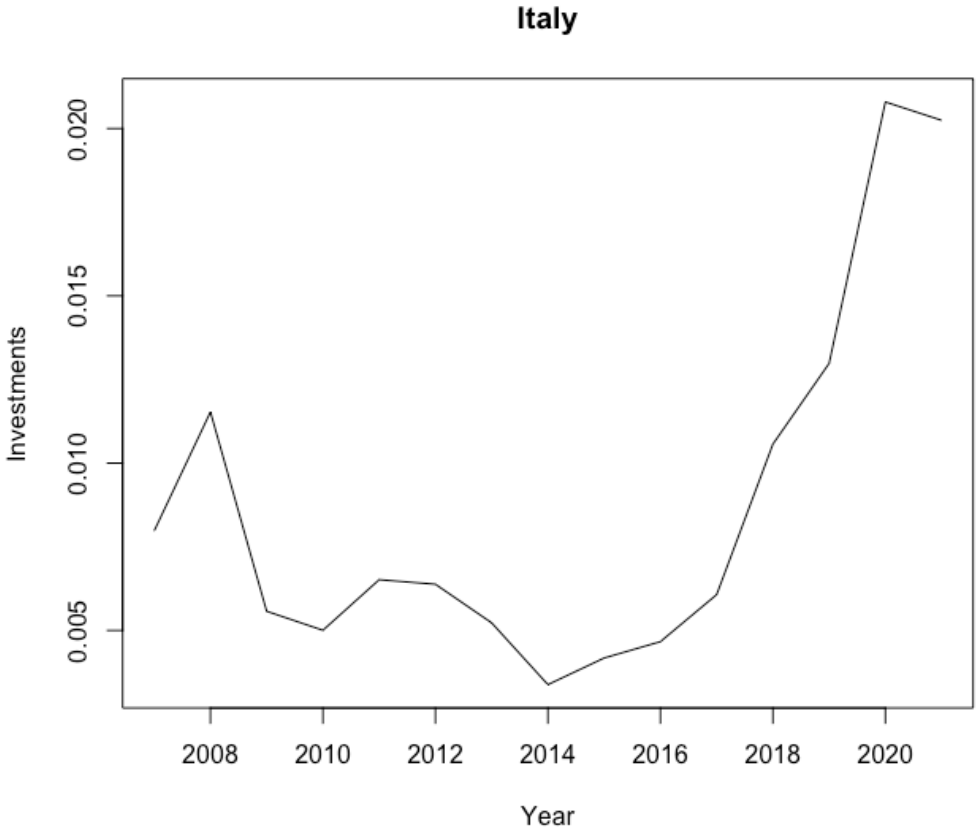
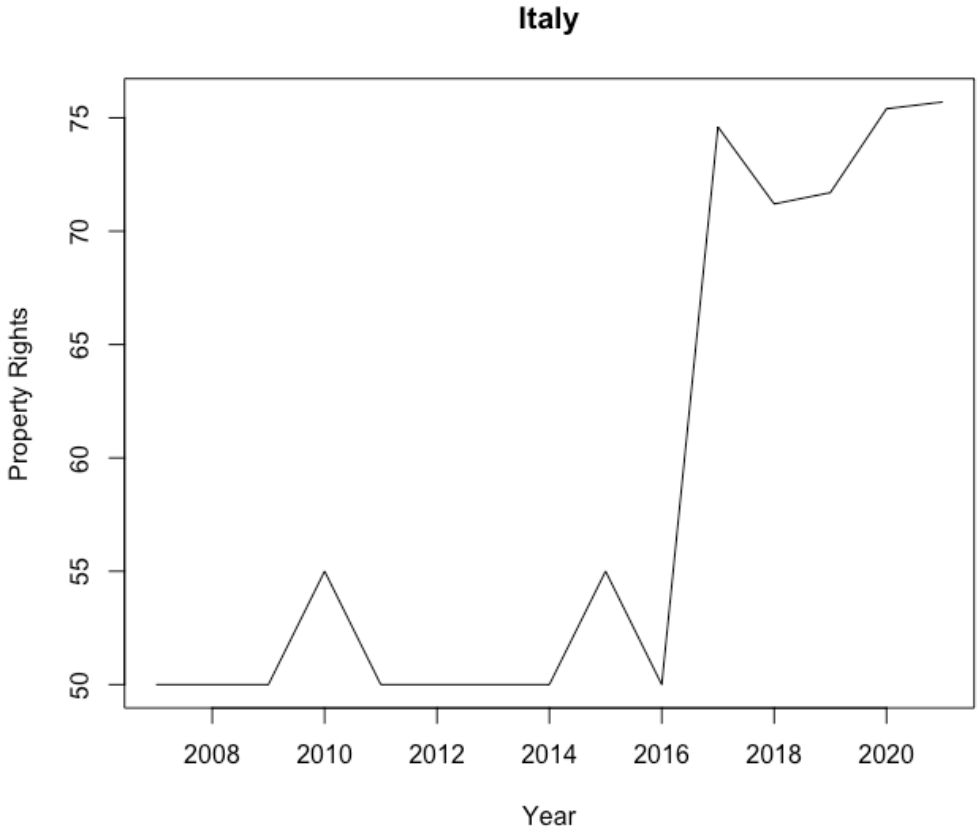


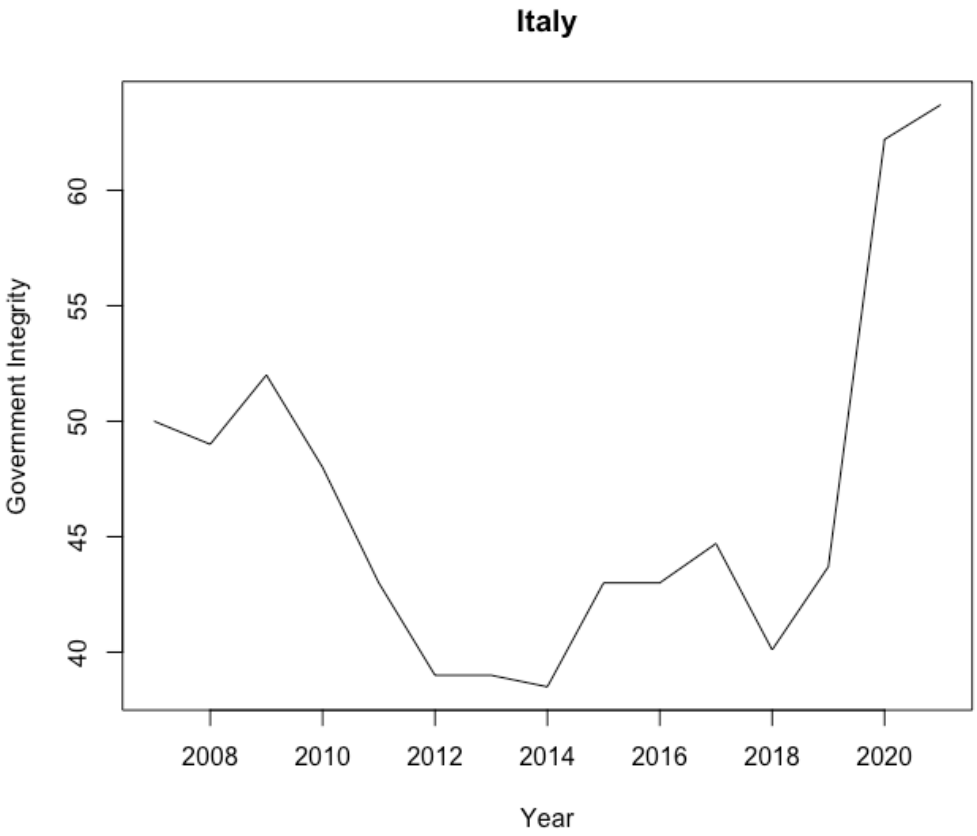
Figure 4.1.2 - Italy property rights from 2007 to 2021



Comparing investment and property rights trends, it seems that there is a positive relationship between the two.

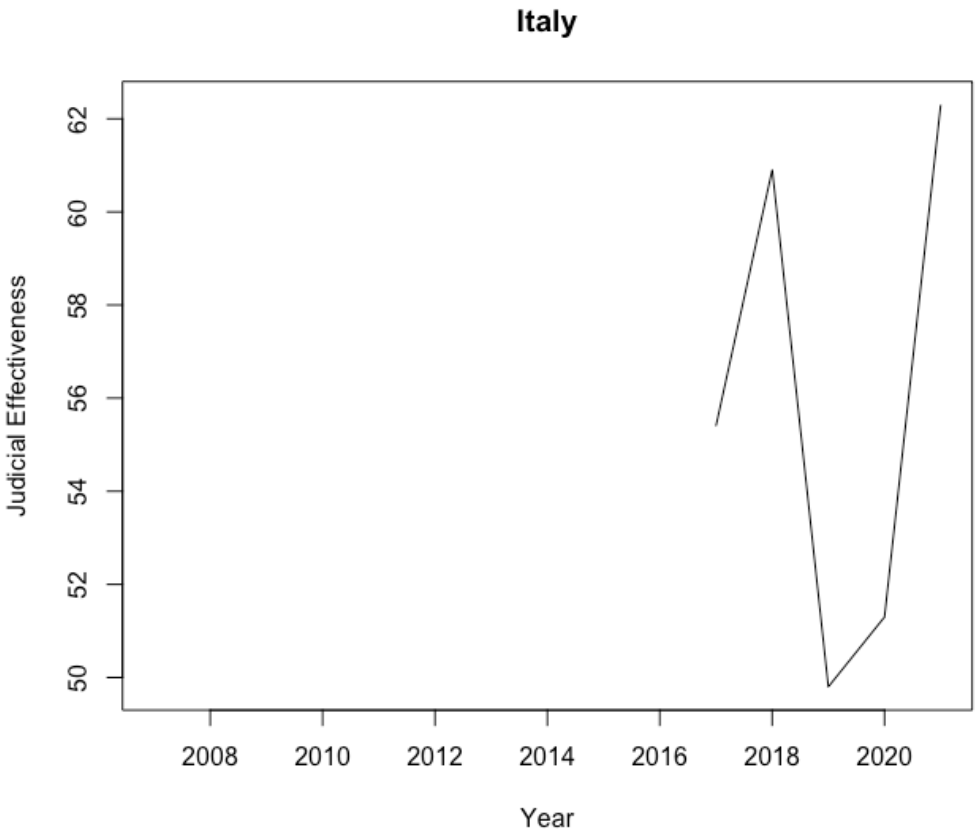
As explained before, venture capitalists invest in firms based on their future development prospects. Intellectual property rights, such as patents, copyrights, and trademarks, are essential for a company's success. Weak property rights can make it difficult for businesses to gain legal protection for their intellectual property, making venture investors unwilling to invest in the company. Furthermore, property rights provide investors with the security that they will be able to recoup their investment if the firm fails, as property rights ensure that a start-up's assets, such as land or equipment, may be sold to repay investors. This sense of safety and assurance is critical for attracting venture capital.

Figure 4.1.3 - Italy government integrity from 2007 to 2021



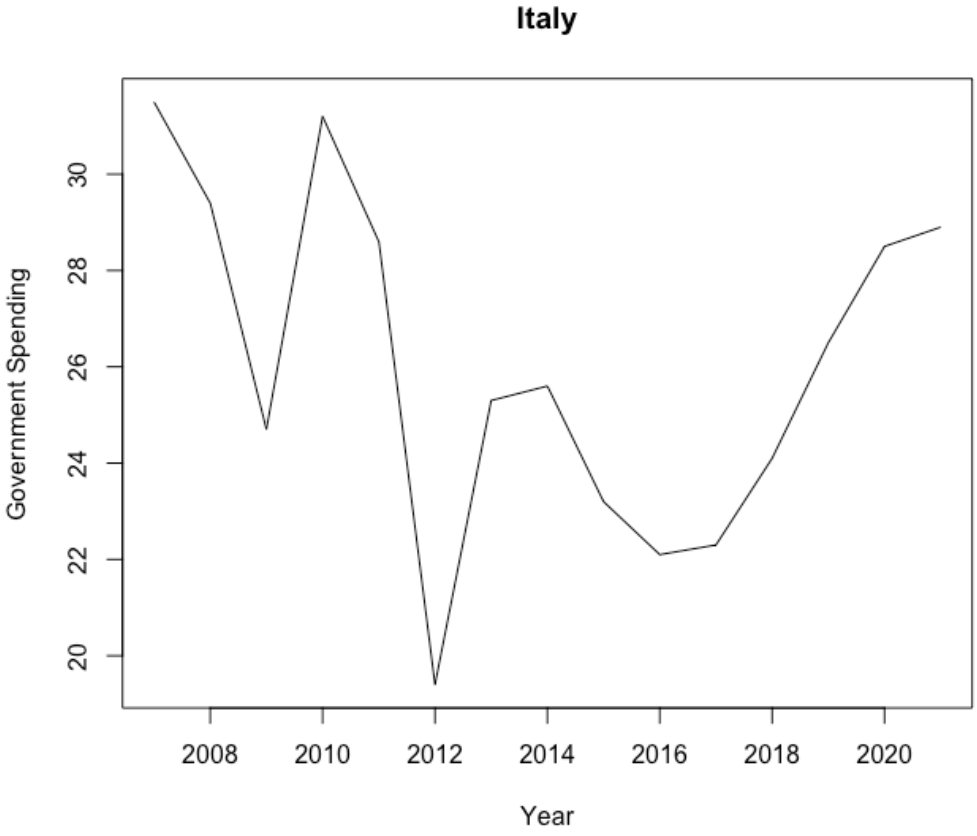
A positive relationship seems even more evident when considering the government integrity. Government integrity is a critical consideration for venture capital investments. This is because a corrupt government can severely effect the success of a business, raise costs and risks, and create an atmosphere where some enterprises may obtain unfair benefits. A transparent and fair government, on the other hand, creates a stable climate that supports innovation, develops competition, and protects intellectual property rights. Because these are all critical factors for the long-term success of start-ups and early-stage businesses, government integrity is an important factor to consider when evaluating investment opportunities.

Figure 4.1.4 - Italy judicial effectiveness from 2007 to 2021



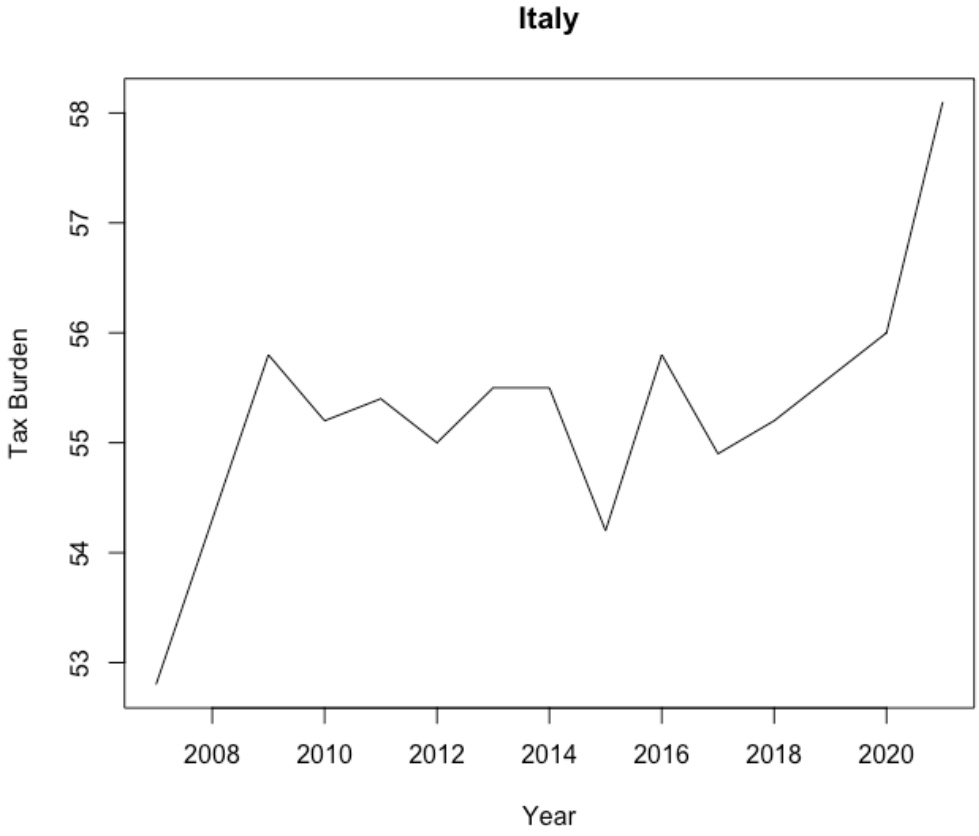
Unfortunately, judicial effectiveness is a factor that has recently been included in the index and for which only data from the last five years are available. Therefore, it is not possible for me to make a qualitative judgement, and, in addition, I will not consider this factor in the statistical analysis later on as the sample is too small to be representative.

Figure 4.1.5 - Italy government spending from 2007 to 2021



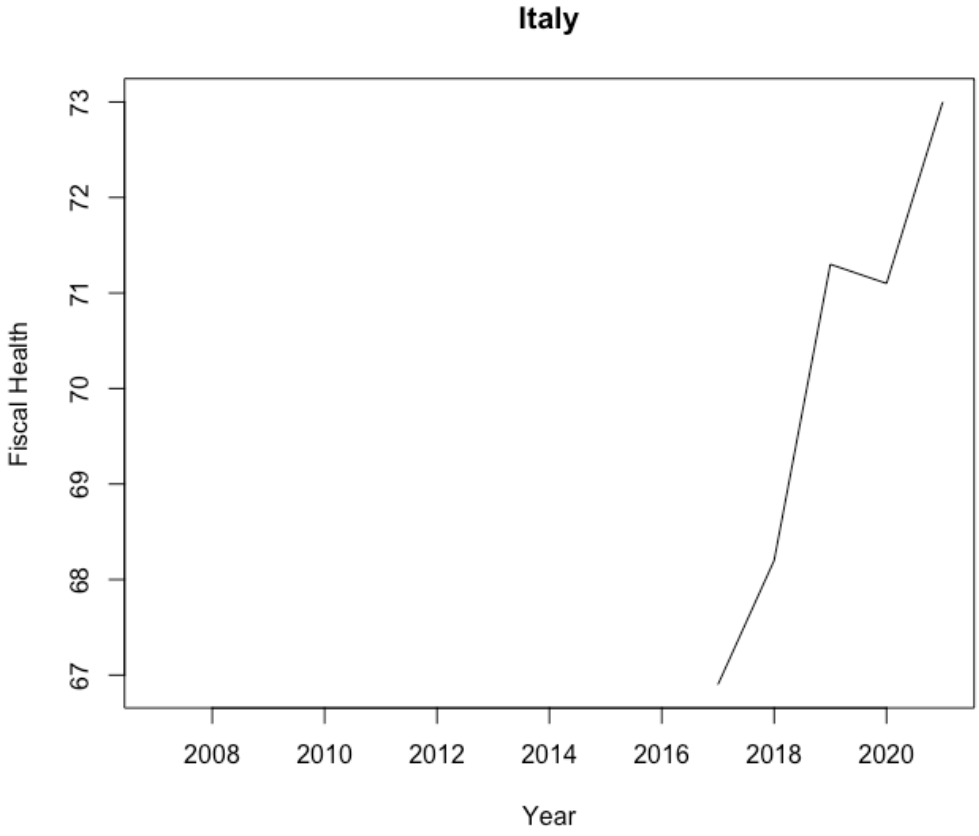
Overall, given the positive relationship from the graphs, government spending seems to generate a crowding-in effect of venture capital investments, at least in Italy.
However, in the following passages, I want to investigate this relationship further to see whether this qualitative result is true up to a certain level of expenditure and what the direction of their correlation actually looks like.

Figure 4.1.6 - Italy tax burden from 2007 to 2021



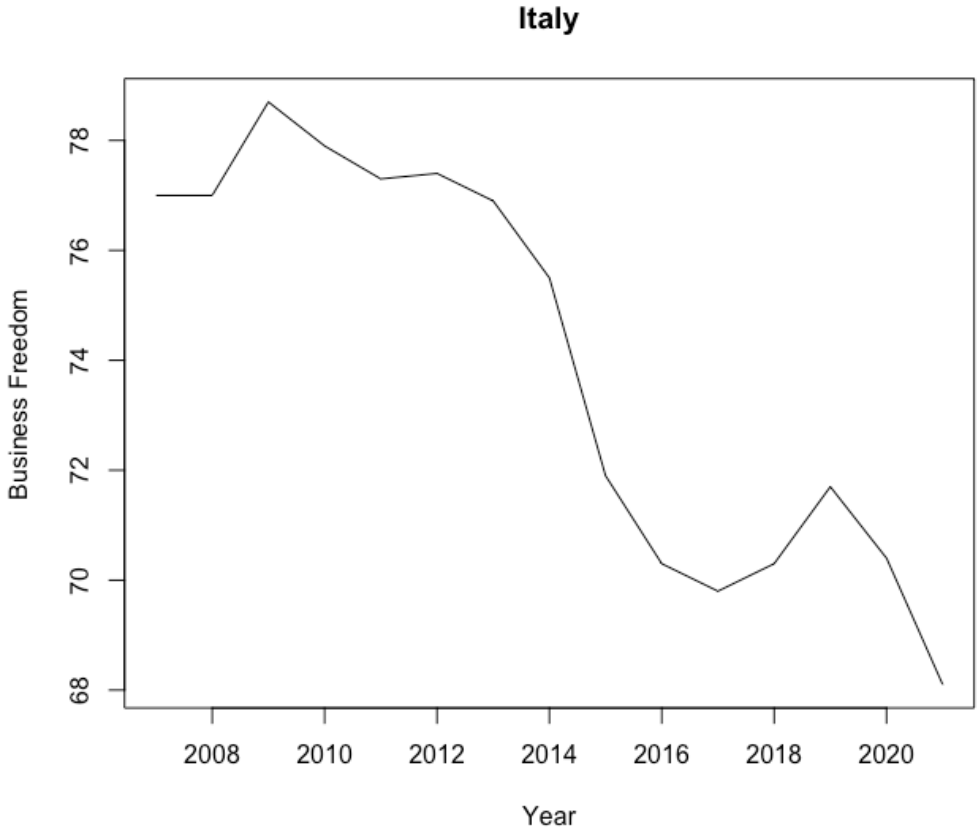
I expected to find a positive relationship here as well, in the sense that with the easing of the tax burden I would have expected an increase in VC investments, which only seems to be true in the period from 2014 to 2021, whereas in the early part of the graphs the relationship is uncertain, if not the opposite.

Figure 4.1.7 - Italy fiscal health from 2007 to 2021



For fiscal health, what was said above for judicial effectiveness applies, namely that the lack of data will not allow me to delve into the underlying relationship, despite the fact that for the five years under consideration there would appear to be a positive relationship.

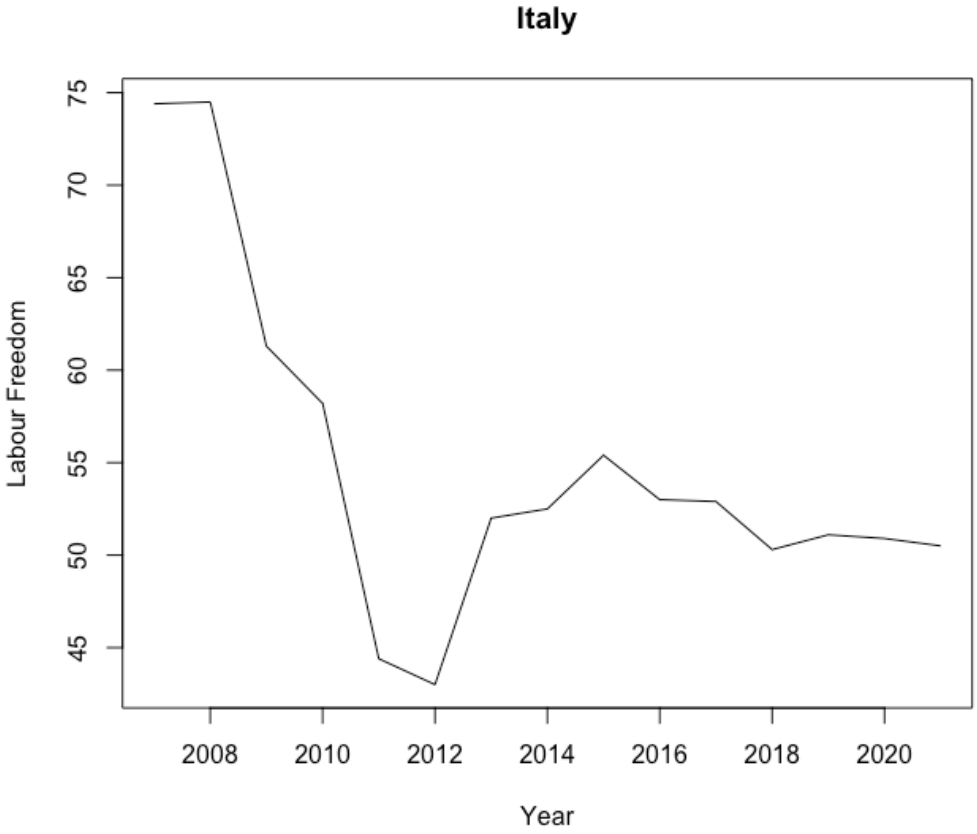
Figure 4.1.8 - Italy business freedom from 2007 to 2021



The relationship between business freedom and government spending is the first surprise of this qualitative analysis. In fact, contrary to what I was expecting, there seems to be a negative relationship between the two.

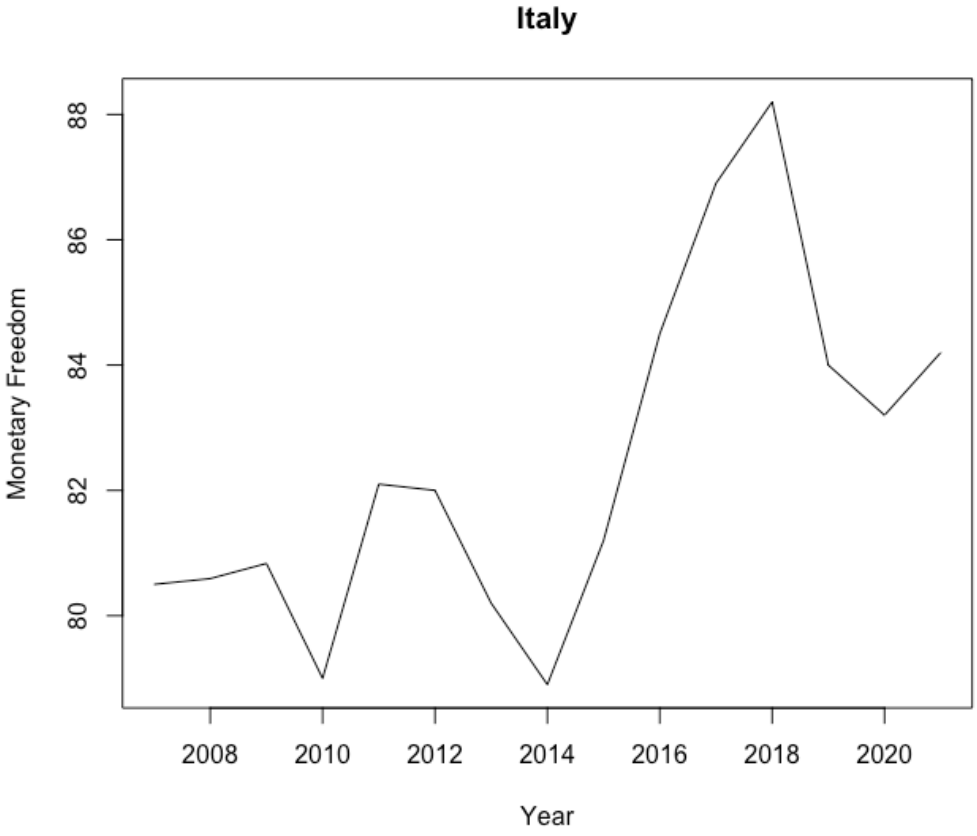
Also in this case, statistics will shed light on this controversial relationship, as a higher degree of business freedom should foster an atmosphere favorable to start-ups and by allowing for greater flexibility and innovation in corporate operations.

Figure 4.1.9 - Italy labour freedom from 2007 to 2021



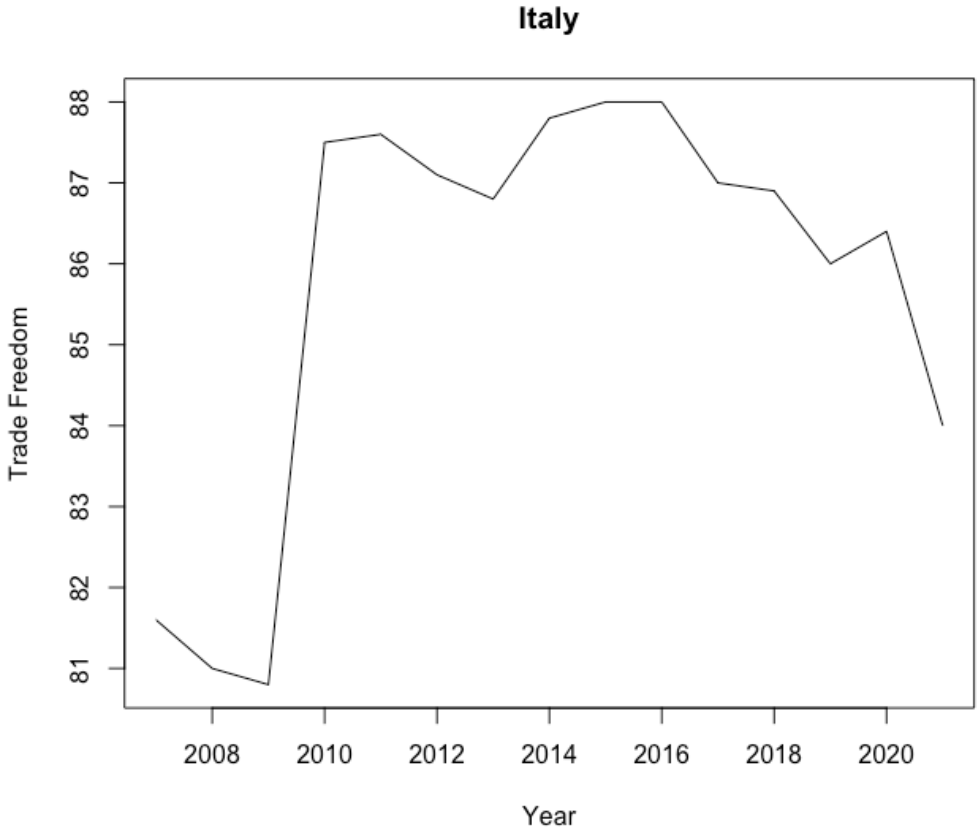
As in the case above, this graph suggests an unexpected negative relationship between labour freedom and VC investments. Excessive labour restrictions can create major employment hurdles, especially for startups that may lack the financial means to comply with onerous requirements. As a result, firms may be unwilling to hire new personnel or expand their operations, resulting in greater labour costs and lower labour market flexibility.
I expect that statistics will later disprove this qualitative observation.

Figure 4.1.10 - Italy monetary freedom from 2007 to 2021



Results tend to be in line with expectations with an underlying positive relationship between monetary freedom and venture capital investments, as monetary freedom is a crucial aspect for venture capital investments since an unstable or distorted monetary system can raise business risks, lower investment value, and harm the long-term development potential of start-ups.

Figure 4.1.11 - Italy trade freedom from 2007 to 2021

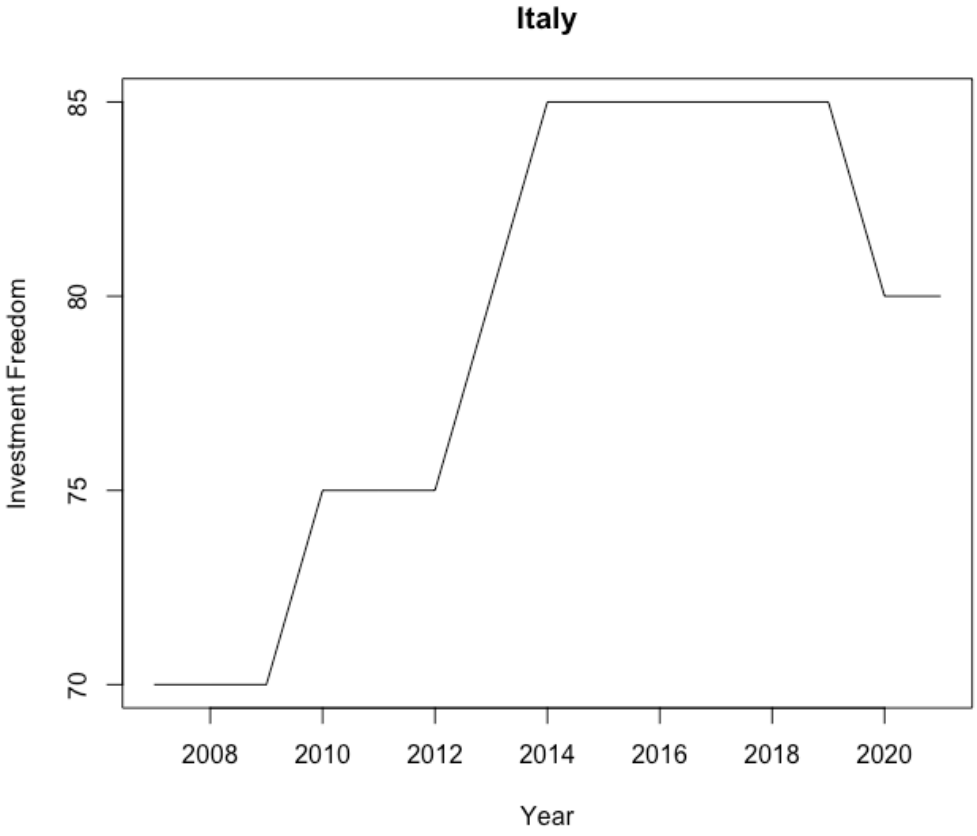


The relationship between trade freedom and venture capital investment is unclear and cannot be determined graphically.

Nevertheless, I notice that the rating of trade freedom is quite high during the time horizon considered in Italy, which could mean that a small variation of it does not affect the level of VC investments.

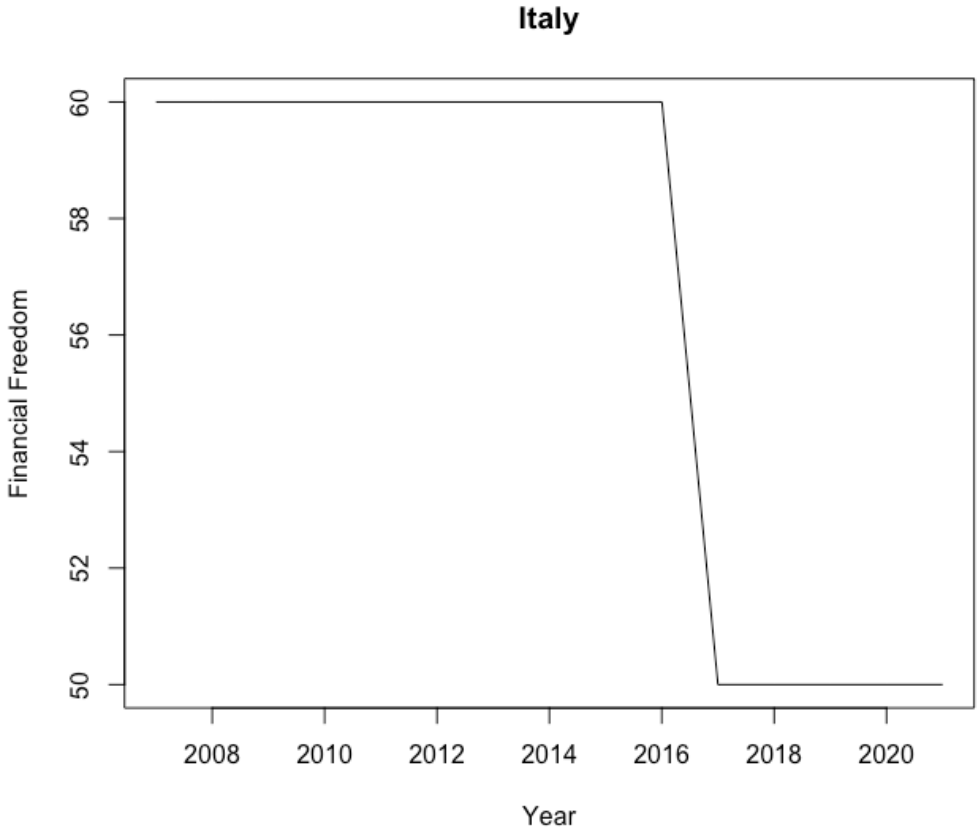
It will be interesting to see whether a positive relationship will be evinced by also considering the other countries in the statistical analysis, as I expect.

Figure 4.1.12 - Italy investment freedom from 2007 to 2021



Overall, the relationship between investment freedom and venture capital investments seems weak in Italy, although investment freedom is crucial for venture capital investments since it influences finance availability, capital costs, and the ease of doing business in a country.

Figure 4.1.13 - Italy financial freedom from 2007 to 2021



The relationship between financial freedom and VC investment is hard to infer graphically considering Italy as example.
In this case, I expect that statistics will provide me a positive relationship, as a higher degree of financial freedom can lead to easier and increased access to funding.

As next step, taking into consideration the literature review previously carried out, the qualitative observations resulting from these graphs, extending these considerations to all other countries as well, and my own expectations, I will formulate research hypotheses to be further investigated later in my econometric model.

4.2 Exceptions in the dataset

As a result of the qualitative analysis, I will consider all factors in my analysis except these judicial effectiveness and fiscal health factors, having only data of the last 5 years.
Another reason why I also decided to carry out a qualitative analysis first is because, based on my current knowledge and considering what I learnt during the course of the literature review, I expected to find 3 exceptions, namely United States, Canada, and Israel.
It is particularly important to mention the United States since it is the leading economy in the VC industry, as well as the first country in terms of investment and a leader in the growth of the technology sector. Canada is trying, especially in the last years, to overcome the US by attracting entrepreneurs from all over the world under particular and favorable terms. In recent years, Israel has distinguished itself as a hub for the development of innovative companies, and it is clear that a comparison with other European economies is useful in order to obtain a true picture of the diversity of growth in the innovation market.
Before delving into each case, it can be seen from the investments in these countries how they differ from the rest.

Table 4.2.1 - VC investments as % share of GDP in the United States from 2007 to 2021

YEAR	VC INVESTMENTS AS % SHARE OF GDP IN THE UNITED STATES
2007	0.258
2008	0.246
2009	0.184
2010	0.203
2011	0.281

2012	0.244
2013	0.271
2014	0.397
2015	0.442
2016	0.425
2017	0.427
2018	0.671
2019	0.634
2020	0.634
2021	0.634

Table 4.2.2 - VC investments as % share of GDP in Canada from 2007 to 2021

YEAR	VC INVESTMENTS AS % SHARE OF GDP IN CANADA
2007	0.118
2008	0.076
2009	0.059
2010	0.065
2011	0.078
2012	0.078
2013	0.099
2014	0.103
2015	0.115
2016	0.156
2017	0.173
2018	0.150
2019	0.197
2020	0.176

2021	0.442

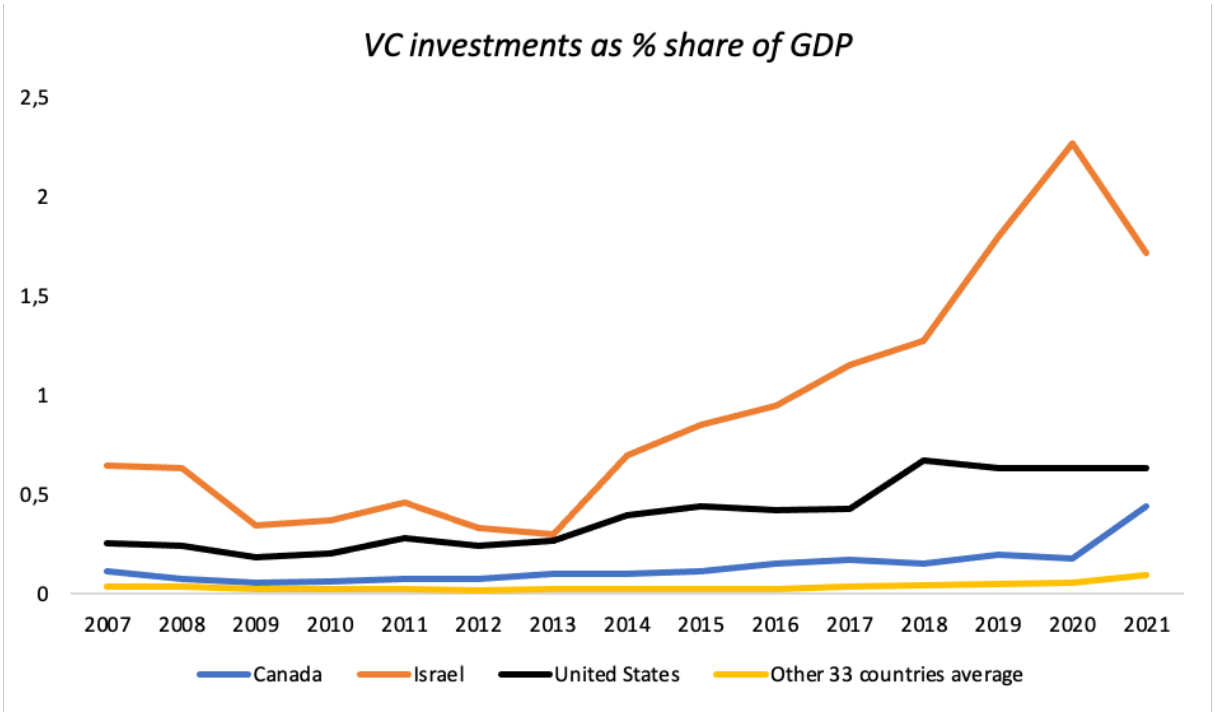
Table 4.2.3 - VC investments as % share of GDP in Israel from 2007 to 2021

YEAR	VC INVESTMENTS AS % SHARE OF GDP IN ISRAEL
2007	0.650
2008	0.633
2009	0.349
2010	0.371
2011	0.460
2012	0.331
2013	0.301
2014	0.698
2015	0.851
2016	0.949
2017	1.156
2018	1.276
2019	1.802
2020	2.272
2021	1.717

Table 4.2.4 - Average VC investments as % share of GDP in the other 33 countries from 2007 to 2021

YEAR	AVERAGE VC INVESTMENTS AS % SHARE OF GDP IN THE OTHER 33 COUNTRIES
2007	0,037
2008	0,036
2009	0,025
2010	0,023
2011	0,023
2012	0,021
2013	0,024
2014	0,026
2015	0,026
2016	0,028
2017	0,036
2018	0,044
2019	0,053
2020	0,056
2021	0,098

Figure 4.2.1 - VC investments as % share of GDP



As can be seen from the tables and graph above, there is a significant discrepancy between the level of VC investments as % share of GDP in the United States, Canada, and Israel, and the other remaining 33 countries.

4.2.1 The United States case

To explain the difference between the United States and the other countries it would be sufficient to say that the US can be awarded as the place where venture capital has been invented. In addition, the United States is the country whose economy in recent decades has been most characterized by the relevance of venture capital to the economic system. Venture capitalists' investments in the US are on a scale that places them first worldwide in terms of the total amount financed through this activity.

As highlighted by Da Rin, Nicodano, and Sembenelli (2006), governments all over the globe have been striving to replicate the spread and success of venture capital in the United States as economies become increasingly reliant on innovation and entrepreneurship to achieve long-term growth.

Moreover, Strebulaev and Gornall (2015) analysed a sample of 1,340 US listed companies in the period 1974-2014, considering both VC-funded companies in their early years and companies that grew independently. The overall estimate was a cumulative capitalisation of around 7 billion, with the creation of 8 million jobs. The evidence in their empirical analysis showed that venture capital financed 42% of these, accounting for the creation of over 3 million jobs and 63% of the total capitalisation.

Venture capital development in the United States may be traced back to the late 1970s and early 1980s. Following the oil crisis, small and medium-sized organisations increased their relevance in the country's socioeconomic sector, sharing the burden of employment creation, which had previously been the duty of huge corporations. The expansion of small and medium enterprises revealed the need to fund realities with great growth potential but significant investment risk margins. This new situation for company development was matched by three critical initiatives for VC growth in the United States:

i. The Revenue Act which in 1977 reduced capital gain taxation, as also pointed out by Poterba (1989a, 1989b).

ii. The amendment to the Employee Retirement Income Security Act of 1979's "prudent man rule" which allowed pension funds to invest up to 10% of their available financial resources in VC funds (Gompers, & Lerner, 1998). Gompers (1994) revealed how the participation of pension funds in the venture capital market in 1988 was 46%, up from 15% ten years earlier.

iii. The launch of the Small Business Innovation Research (SBIR) program by the United States Business Administration. Government rewards to private parties certified

companies' excellence, assisted companies in establishing themselves, and allowed companies to seek additional funding (Lerner, 1999).

4.2.2 The Canada case

As Canada emerged from the COVID-19 crisis, one of the government's top priorities was to strengthen the Canadian economy. As part of Budget 2021, the government made significant expenditures to help Canadian businesses start up and build up, as seen by the increase in 2021 in the graph 3.2.

The Government of Canada invested $371 million across three streams, as announced in Budget 2017 and enhanced in the 2018 Fall Economic Statement. VCCI Stream 1 invested in big funds-of-funds to assist Canadian venture capital fund managers, whereas VCCI Stream 2 invested in developing and diversified managers, underrepresented areas and industries, and innovative fund structures. VCCI Stream 3 invested in venture capital funds that primarily invest in clean technology start-ups[4].

Furthermore, there are other factors which have contributed to the Canadian VC industry development. The Canadian government has issued two programmes to attract entrepreneurs from all over the world:

i. The Start-Up Visa program, which allows prospective entrepreneurs to immigrate to the nation and establish a new firm. To be qualified, immigrant entrepreneurs must demonstrate that their business concept is distinctive, has the potential to create new job opportunities for Canadians, and can compete effectively on a global scale[5].

[4] Government of Canada information on venture capital: https://ised-isde.canada.ca/site/sme-research-statistics/en/venture-capital-catalyst-initiative

[5] Ibidem

ii. The Global Skills Strategy, a program created to aid eligible firms in the country in recruiting skilled labour from across the world[6].

In addition, the structurally competitive and innovative university system that provides outstanding talent and acts in partnership with the business world.

Other advantages include Canada's far cheaper cost of living in comparison to Silicon Valley, which allows international firms to pay lower wages, and Canada's government-funded national health care system, which eliminates the need for tech companies to worry about health coverage for their staff.

It is not by chance that some of the world's largest firms are investing in and shifting part of their operations to Canada. Uber, for example, has announced intentions to invest more than $200 million in Toronto to expand its Uber ATG research centre, which focuses on the development of self-driving cars. Facebook has already built one of its four AI research centres in Montreal, contributing $7 million to the initiative in 2017. Other tech behemoths, such as Google and Netflix, have also established operations in Canada. Netflix opened its first permanent production facility outside of the United States in Canada in 2017, promising to invest at least $500 million in the production of films and television shows in both English and French over the next five years. Amazon also announced the establishment of its Toronto Tech Hub in 2018.

Finally, in 2019, Canada debuted its first unicorn[7] Shopify to the world, followed by others such as Hootsuite, Nuvei, and Coveo.

4.2.3 The Israel case

[6] Government of Canada information on venture capital: https://ised-isde.canada.ca/site/sme-research-statistics/en/venture-capital-catalyst-initiative

[7] Unicorn is a term to indicate start-ups whose value exceeds 1 billion dollars

In recent years, Israel has been rated top in the world in terms of venture capital investment per person, attracting more cash for investment activities in this area than any other EU country[8]. In the field of innovation and research and development, Israel is, in fact, the first country in the world.

Israel has traditionally staked significantly on creative entrepreneurship, believing that it is one of the most important levers for raising GDP, creating jobs, and attracting foreign money to the small Middle Eastern state. Since 2016, what was the Office of the Chief Scientist has been renamed the Israel Innovation Authority in order to promote economic development via technological innovation in collaboration with the industry.

Among the Authority's responsibilities is the administration of the Technological Incubators Program[9], a government-funded venture capital fund that supports the growth of chosen start-ups housed in incubators, whose project started in 1991 as pointed out by Caselli and Sattin (2011). Funding is supplied for 85% of the total investment required to grow these enterprises, with the remaining 15% funded by private investors. In this case, the funds are not non-returnable, but there is a risk-sharing logic only in the event of bankruptcy; in fact, these companies are only required to repay the capital (with ample deferments) in the event of success and through a percentage of sales made on the reference market. The government is not a partner and does not make VC-style investments; instead, it offers interest-free conditional loans.

The Yozma Program[10], launched in 1993, is the second key intervention to be recognized. The programme was designed with the goal of developing venture capital and boosting the attractiveness of international companies in the Israeli innovation industry by acquiring best practises and know-how. The concept was for the government to step in and finance VC funds in collaboration with third-party investors since the funding was designed with a two-fold multiplier as compared to state funds, meaning, for example, that 2 million in third-party financing granted access to 1 million in programme funds. The uniqueness is that if the VC fund developed and proved profitable over the following five years, the government, which controlled up to 40% of the shares, sold them to third-party investors at cost plus interest.

[8] IVC Research Center data provider on Israeli high-tech industry and venture capital and private equity activity in the country: https://www.ivc-online.com

[9] Technological Incubators Program website: https://innovationisrael.org.il/en/program/incubators-incentive-program

[10] Yozma Program website: https://www.yozma.com/

Because of this strategy, investors from all over the world were drawn to the investment opportunity with significant margins, given the upward potential of acquired assets.

5. Empirical research

5.1 Hypothesis

At this point, I can firmly assert that the climate of a country influences the level of venture capital investments in that country.
I expect that The Index breadth will allow me to track which factors have influenced VC investments in the 36 countries under analysis over the 15 years period between 2007 and 2021.
The first hypothesis of my analysis is to confirm the correctness of using The Index of Economic Freedom by The Heritage Foundation to explain the VC investment phenomenon.

H1: The Index of Economic Freedom by The Heritage Foundation will explain the level of VC investments.

In addition, following the qualitative analysis carried out in the previous paragraph, I expect an annual fluctuation in the significance of each factor.
Given more broaden macroeconomics condition and the peculiarity of each country, it is reasonable to think that the same grading of the same factor may have more impact in one year than in another.
As pointed out by Wooldridge (2009), the start-up process in Europe was challenging due to the laborious patent system, therefore an improvement in the property rights' scoring by European countries can achieve more results at a given time or it can take effect from then on.
Ooghe et al. (1991) recognized how tax burden's scoring improvement generated higher venture capital investments in Europe in the period of their analysis.

On the same track, Poterba (1989a, 1989b) highlighted how improvements in the investment freedom factor, by lowering taxes on capital gain, resulted in increased venture capital fundraising under the time horizon of his analysis.
Consequently, considering the breadth of my analysis period, for my second hypothesis I expect that each factor may have been relevant, if ever relevant, only in a certain period and not over the entire analysis period.

H2: Each year, the importance of each of the 10 factors will be different over the time horizon considered, shifting from years in which the factor may have been significant to years in which it does not explain the level of venture capital investments.

The next hypothesis is complementary to the H2 hypothesis and aims to explain the underlying phenomenon.
Since the objective of this paper is also to help and direct governments in the use of actions suggested by the factors under analysis, given that many OECD countries' policy initiatives have intensified in recent years to help start-ups and VCs (Wilson & Silva, 2013), I hypothesise to be able to explain how the variation in the scoring of each factor was able to determine a variation in the level of VC investments, so as to go and identify which variations of the factors were more decisive and to go and investigate them in order to understand which were the surrounding macroeconomic conditions that perhaps allowed that factor to be more impactful.
However, I recognise that the effects of an improvement in the scoring of a factor cannot result immediately in an improvement in the level of venture capital investments.
Therefore, I will analyse the annual change in factor scoring also considering a lag of 1 and 2 years in the level of VC investments.

H3.1: The annual change in factor scoring will explain the annual change in VC investments in the same year.

H3.2: With a lag of 1 year, the annual change in factor scoring will explain the annual change in VC investments.

H3.3: With a lag of 2 years, the annual change in factor scoring will explain the annual change in VC investments.

As I have already stated in the first paragraph of chapter 2, I believe that governments intervention can facilitate the establishment of start-up and venture capital ecosystem. To go one step further, based on the findings of Brander et al. (2014) who discovered that economies with greater levels of government expenditure had higher levels of VC investments per business and more VC-funded firms, suggesting that GVC finance supplemented rather than replaced VC finance, considering also the evidence provided by Hood (2000) who demonstrated crowding-in effects, and lastly considering what Colombo et al. (2016) demonstrated that, due to signalling effects, government spending may have a crowding-in impact on the growth of VC markets since they preferentially offered money to underfunded early innovative businesses, indicating to private sector investors their high potential, I particularly expect my research to prove a crowding-in effect generated by government spending factor. However, it is important to point out that this research will focus on the general level of government spending, without looking specifically at the level of government spending in the VC sector.

H4: Government spending have generated a crowding-in effect on venture capital investments.

5.2 Experiment procedure

All data have been collected on an Excel spreadsheet and then moved to the statistical computing software R, where the dataset for my research has been created using the software's integrated development environment RStudio, which is a programming language for statistical computation and graphics.
The functions used in the analysis were:

i. read_excel( ): to import the data I have gathered from Excel to RStudio

ii. data[ ]: to return a vector from the given dataset. I have created both a vector with all the data from all the years of the time horizon under analysis, and 15 vectors for each year in order to go into more specific analysis of the relationships existing on the individual year

iii. c(0,…,0): this function creates an empty vector of 12 values where correlation coefficients will be passed from the vectors and the appropriate function

iv. cor( ): to compute variable correlation coefficients between the VC investment as % share of GDP and each of the 10 factors of The Index of Economic Freedom by The Heritage Foundation

v. plot( ): to visualize graphically data to evaluate if any outliers are present and need to be eliminated

vi. lm( ): to carry out regression analysis

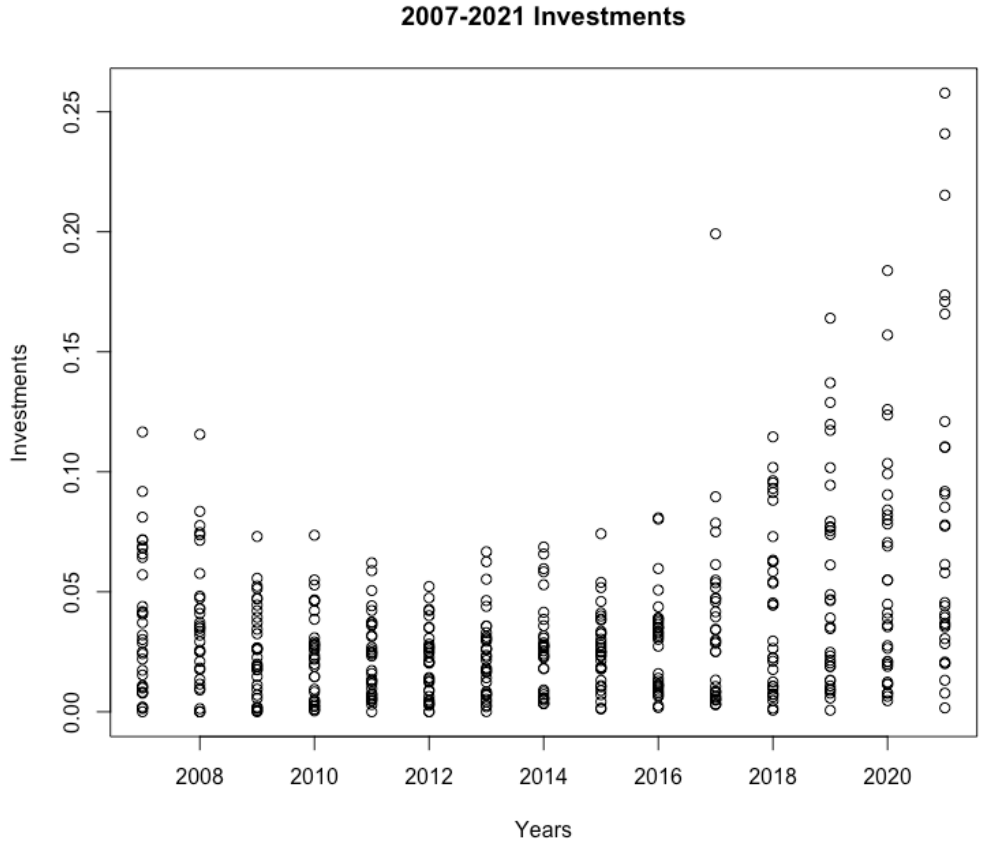
vii. fm( ): to visualize the results of the regression analysis

viii. shapiro.test( ): to check for data normality, necessary condition to be verified in order to be able to perform data regression and provide interpretation

Before running the statistical analysis, I have filled in the missing data. In fact, there were some years where the scoring of a factor or the level of VC investments as a % of GDP of a country was missing, so I decided to fill it with the corresponding data from the previous year.

There were years in the analysis where it was necessary to eliminate the outliers present and repeat the statistical calculation.

Figure 5.2.1 - Plot of venture capital investments from 2007 to 2021



As can be seen from the graph above, for example, the year 2017 presented 1 fairly obvious anomaly which I have removed.

I carried out the calculation of the standardised values to assess whether or not I was in the presence of outliers in the other years when the graphical display was less obvious. In particular, the higher a standardised value is, the greater the distance of the original value from the mean. To calculate the standardised value, I use the following formula:

$$VC\ investment\ standardised\ value\ = \frac{\text{VC investment value} - \text{VC investments average}}{Standard\ deviation}$$

Any standardised value less than -3 and greater than +3 is considered an outlier.

6. Results

6.1 The relationship between VC investments and the factors

The hypothesis **H1** is immediately tested via a linear regression on the entire dataset over the entire time horizon.

Table 6.1.1 - Linear regression results on all the dataset

MULTIPLE R-SQUARED	ADJUSTED R-SQUARED	P-VALUE
0.4177	0.3726	< 2.4e-13

First of all, such a low p value, well below the 0.05 threshold, indicates the statistical significance of the model, and allows me to go on to interpret the other statistical results.
Secondly, considering for example Henseler et al. (2009) categorization of multiple R-squared between 0.25 and 0.50 as moderate, I can affirm that the level of VC investments as % share of GDP can be mediumly explained by the factors of The Index of Economic Freedom by The Heritage Foundation, given a multiple R-squared of 0.4177.
In addition, the adjusted R-squared, which analyses just the independent variables that have an influence on the model's performance, is within the 0.25 - 0.50 range identified by Henseler et al. (2009), meaning that the independent variables have moderate influence on the model's performance.

Furthermore, I carried out a regression on each single year over the time horizon considered, to check the consistency of the total result also on a year-by-year basis.

Table 6.1.2 - Linear regression results on all the dataset

YEAR	MULTIPLE R-SQUARED	ADJUSTED R-SQUARED	P-VALUE
2007	0.6206	0.4481	0.0058670
2008	0.5699	0.3744	0.0174400
2009	0.5524	0.3489	0.0243800
2010	0.7001	0.5736	0.0006700
2011	0.7307	0.6083	0.0002384
2012	0.7017	0.5661	0.0006375
2013	0.5678	0.3713	0.0181800
2014	0.4606	0.2154	0.1047000
2015	0.2923	-0.0447	0.5755000
2016	0.4747	0.1982	0.1491000
2017	0.6210	0.4405	0.0081810
2018	0.6381	0.4736	0.0038350
2019	0.4385	0.1711	0.1630000
2020	0.7120	0.5811	0.0004553
2021	0.6090	0.4135	0.0146600

The results on each individual year are much more interesting given significantly low p-values and high multiples R-squared.

Even though there are some years, 2015 in particular, where the results do not show strong statistical links, I think the results are overall satisfactory. In particular, there are several years where the multiple R-squared is very close to the 0.75 threshold identified by Henseler et al.

(2009), suggesting that the level of VC investments each individual year as % share of GDP can be highly explained by the factors of The Index of Economic Freedom by The Heritage Foundation.

In conclusion, I can affirm that the first hypothesis **H1** of my research has been verified and that The Index of Economic Freedom by The Heritage Foundation explains the level of VC investments as % share of GDP over the time horizon considered, so I can continue to interpret the results of the analysis and use them to test the other hypotheses, especially on a year-to-year basis.

6.2 The overall impact of the factors on VC investments

Continuing with the research study, it is time to present the results which have helped me to verify the second hypothesis **H2**.

Initially, a linear regression was performed on the aggregate model to check the consistency of the data.

Table 6.2.1 - Regression results on all the aggregated dataset

	ESTIMATE	P-VALUE	
PROPERTY RIGHTS	0.0001859	0.0758	Δ
GOVERNMENT INTEGRITY	0.0005981	0.00123	* *
GOVERNMENT SPENDING	- 0.0001024	0.33171	

TAX BURDEN	- 0.0002056	0.23483	
BUSINESS FREEDOM	0.0001019	0.59651	
LABOUR FREEDOM	0.0002149	0.05326	Δ
MONETARY FREEDOM	0.0002873	0.40863	
TRADE FREEDOM	- 0.0024541	1.43e-08	* * *
INVESTMENT FREEDOM	0.0001634	0.36516	
FINANCIAL FREEDOM	0.0003517	0.03245	*

In particular, aggregated results suggest the importance of 3 factors with the p-value below the 0.05 threshold (trade freedom, government integrity, and financial freedom), and other 2 factors with p-value below the 0.10 threshold (property rights, labour freedom).

These results justify the use of The Index of Economic Freedom by The Heritage Foundation for explaining the level of venture capital investments as % share of GDP and highlight an underlying phenomenon which is to be analysed at a finer and more detailed level in the following paragraphs.

Moreover, a correlation test between the factors of The Index of Economic Freedom by The Heritage Foundation and the level of VC investments has been performed, both on each individual year and on the whole period.

Table 6.2.2 - Correlation results on all the dataset

	VENTURE CAPITAL INVESTMENTS AS % SHARE OF GDP
PROPERTY RIGHTS	0.40968296
GOVERNMENT INTEGRITY	0.42405479
GOVERNMENT SPENDING	- 0.07438509
TAX BURDEN	- 0.30500909
BUSINESS FREEDOM	0.29384518
LABOUR FREEDOM	0.02505957
MONETARY FREEDOM	0.17759940
TRADE FREEDOM	- 0.06744271
INVESTMENT FREEDOM	0.21269552
FINANCIAL FREEDOM	0.29504268

From the overall results, it appears that property rights and government integrity factors have by far the highest positive correlation with the venture capital investments as % share of GDP. This first implication suggests that a first level of action can be undertaken by governments by acting of the improvement of those two factors, which will then lead to an increase in the level of VC investments.

Likewise, the degrees of business, investment, and financial freedom positively affect the level of venture capital investments, therefore governments can also act on those factors to foster the ecosystem.

Intuitively, a solid government can guarantee economic and legislative stability, which serve to provide reassurance to investors and entrepreneurs. A high degree of property rights encourages entrepreneurship and innovation by giving people and organisations with the incentives they need to spend their time, money, and talents in new initiatives. When entrepreneurs know their efforts will be safeguarded by strong property rights, they are more ready to take risks and experiment with new ideas. This certainty that the fruits of their labour would be reaped through

protected property rights drives entrepreneurial engagement. Furthermore, when venture capital investors have faith in the protection of intellectual property rights, they are more likely to fund enterprises that rely substantially on intellectual capital. Intellectual property rights protection ensures that venture capitalists' investments in emerging enterprises are appropriately protected against infringement and unauthorised use.

Government integrity fosters investor confidence by establishing a fair, transparent, and free of corruption regulatory and legal environment. Venture capitalists have more faith in the entire business climate when they view a government to be trustworthy and functioning with integrity. This confidence pushes them to raise their investments in enterprises based in that jurisdiction. A government with high integrity fosters fair competition by fostering an atmosphere in which businesses compete on a level playing field free of undue influence or unethical practices. This fair competition helps startups and creative businesses by allowing them to compete on the strength of their ideas and business strategies. Because it boosts the chance of success and rewards for their portfolio enterprises, venture capitalists are more inclined to invest in nations that support fair competition.

Entrepreneurs and innovators may readily enter and compete in an atmosphere of business, financial, investment, and monetary freedom. Entrepreneurs have more freedom to develop and manage their enterprises since there are fewer impediments and restraints on economic activity. This accessibility attracts venture capitalists because it allows them to find and invest in promising companies without the imposition of needless bureaucratic or regulatory barriers. Business, financial, and investment independence make it easier for venture capitalists to spend more cash in these businesses.

On the other hand, the tax burden factor has the most significant negative correlation with the venture capital investments as % share of GDP.

A high tax burden might deter venture capitalists from investing in high-risk firms and reduce incentives for individuals to engage in venture capital funds. When tax rates rise, a large amount of the returns earned by successful investments are lost to taxes, limiting venture capitalists' potential after-tax profits, and making these investments less desirable. As a result, investors may choose to divert their wealth into alternative investment vehicles such as stocks or real estate, which provide better tax treatment. This shift in investment preferences may reduce the amount of funds available for venture capital investments.

Moreover, although weak in magnitude, it would appear that government spending generates a crowding-out effect, contrarily to what was assumed in the fourth hypothesis **H4**.
Similarly, the overall results suggest a very weak negative correlation between trade freedom and venture capital investments, and an extremely poor positive correlation between labour freedom and venture capital investments.

6.3 The year-to-year impact of the factors on VC investments

As a next step, I will now present the results for each year in order to understand whether the second hypothesis **H2** is verified and to give further support for the rejection of the fourth hypothesis **H4**.

Table 6.3.1 - Property rights correlation results

	PROPERTY RIGHTS - VENTURE CAPITAL INVESTMENTS AS % SHARE OF GDP
2007	0.6073914000
2008	0.6409563300
2009	0.6539537000
2010	0.6796829100
2011	0.6040895400
2012	0.5998839600
2013	0.5594398100
2014	0.3946416000
2015	0.3848301193

2016	0.4564117900
2017	0.6714076900
2018	0.6349079000
2019	0.3714060330
2020	0.5661809100
2021	0.5504020400

Table 6.3.2 - Government integrity correlation results

	GOVERNMENT INTEGRITY - VENTURE CAPITAL INVESTMENTS AS % SHARE OF GDP
2007	0.6694474000
2008	0.6465399700
2009	0.6427852000
2010	0.6577785300
2011	0.6177124800
2012	0.5481821200
2013	0.5554784870
2014	0.3400609300
2015	0.4507571226
2016	0.5406268100
2017	0.6353974470
2018	0.5854363700
2019	0.4154151010
2020	0.5314130600
2021	0.5054123300

Table 6.3.3 - Government spending correlation results

	GOVERNMENT SPENDING - VENTURE CAPITAL INVESTMENTS AS % SHARE OF GDP
2007	- 0.3631787000
2008	- 0.3140488200
2009	- 0.1525509000
2010	- 0.1702587000
2011	- 0.3432969900
2012	- 0.1642843200
2013	- 0.2516442640
2014	- 0.0409284000
2015	- 0.2182733370
2016	- 0.2466605600
2017	- 0.1340071140
2018	- 0.1491657600
2019	- 0.2432354470
2020	- 0.2998653800
2021	- 0.1036537200

Table 6.3.4 - Tax burden correlation results

	TAX BURDEN - VENTURE CAPITAL INVESTMENTS AS % SHARE OF GDP
2007	- 0.5576064000
2008	- 0.5412844800

2009	- 0.4736857000
2010	- 0.4770565700
2011	- 0.6194136900
2012	- 0.3918299700
2013	- 0.3430188970
2014	- 0.1953264700
2015	- 0.2674382635
2016	- 0.4048115200
2017	- 0.3685577470
2018	- 0.3563041500
2019	- 0.3244691000
2020	- 0.3326548900
2021	- 0.5212786100

Table 6.3.5 - Business freedom correlation results

	BUSINESS FREEDOM - VENTURE CAPITAL INVESTMENTS AS % SHARE OF GDP
2007	0.6615254000
2008	0.5670498400
2009	0.5867184000
2010	0.6729011000
2011	0.6225303300
2012	0.6117479100
2013	0.5645612770
2014	0.4535547600
2015	0.4310831325
2016	0.5157492300

2017	0.5759390540
2018	0.5821190100
2019	0.2782889910
2020	0.4671909300
2021	0.4696772400

Table 6.3.6 - Labour freedom correlation results

	LABOUR FREEDOM - VENTURE CAPITAL INVESTMENTS AS % SHARE OF GDP
2007	0.1035841000
2008	0.0660612300
2009	0.1509223000
2010	- 0.0321129800
2011	0.1330808300
2012	0.0199506700
2013	0.0054558040
2014	- 0.1752216600
2015	- 0.0002243332
2016	- 0.0224206300
2017	0.1568948140
2018	0.2056916900
2019	0.0067825850
2020	- 0.1371298500
2021	0.0559836600

Table 6.3.7 - Monetary freedom correlation results

	MONETARY FREEDOM - VENTURE CAPITAL INVESTMENTS AS % SHARE OF GDP
2007	0.3155466000
2008	0.2801650200
2009	0.3532007000
2010	0.2974059300
2011	0.1066701900
2012	- 0.0223458200
2013	0.3077746390
2014	0.0437464800
2015	0.1819408841
2016	0.1320572200
2017	0.2077259820
2018	0.1745833100
2019	- 0.0725778840
2020	0.1786177500
2021	0.2588988900

Table 6.3.8 - Trade freedom correlation results

	TRADE FREEDOM - VENTURE CAPITAL INVESTMENTS AS % SHARE OF GDP
2007	0.1551721000
2008	0.1840971600
2009	0.1615432000

2010	0.0174189300
2011	- 0.0517996500
2012	- 0.1066693700
2013	- 0.1800518550
2014	- 0.2474227400
2015	0.1127539849
2016	0.0521727000
2017	- 0.0060016910
2018	- 0.0964996200
2019	- 0.1428358240
2020	0.0142127900
2021	0.0363294500

Table 6.3.9 - Investment freedom correlation results

	INVESTMENT FREEDOM - VENTURE CAPITAL INVESTMENTS AS % SHARE OF GDP
2007	0.2648041000
2008	0.4900792400
2009	0.4021654000
2010	0.2943390100
2011	0.2998081700
2012	0.3726614900
2013	0.2799402860
2014	0.1927447300
2015	0.2562521313
2016	0.2552635500
2017	0.3269896760

2018	0.2998203900
2019	0.2072390120
2020	0.3730916600
2021	0.3325283300

Table 6.3.10 - Financial freedom correlation results

	FINANCIAL FREEDOM - VENTURE CAPITAL INVESTMENTS AS % SHARE OF GDP
2007	0.2428402000
2008	0.4731410300
2009	0.4940350000
2010	0.4479362200
2011	0.4124165900
2012	0.4585294900
2013	0.3599854510
2014	0.3556058500
2015	0.3360875303
2016	0.3712326600
2017	0.5211158530
2018	0.4992876100
2019	0.3704552410
2020	0.5265363600
2021	0.4465388000

The year-to-year view of the correlations between each factor and the level of venture capital investments as % share of GDP shows at first glance how the relationship changes from year to year. This change is especially evident in factors such as labour and trade freedom, whose correlation sign changed several times during the 15 years of analysis. However, the correlation between those two factors and the level of venture capital investments as % share of GDP is weak, which allows me to state the inconsistency of the results of the relationship between labour freedom and the level of venture capital investments as % share of GDP, and between trade freedom and the level of venture capital investments as % share of GDP.

The importance of the property rights and government integrity factors highlighted in the overall results in the previous paragraph is also confirmed by the results on a per year basis.

Table 6.3.11 - Factor with the highest correlation each year

	FACTOR WITH THE HIGHEST CORRELATION
2007	Government integrity
2008	Government integrity
2009	Property rights
2010	Property rights
2011	Business freedom
2012	Business freedom
2013	Business freedom
2014	Business freedom
2015	Government integrity
2016	Government integrity
2017	Property rights
2018	Property rights
2019	Government integrity
2020	Property rights
2021	Property rights

In fact, in order to highlight the importance of these two factors, I have summarised in the table above which factor had the highest correlation each year (regardless of the direction of the correlation).
As can be seen, 11 times out of 15 years, property rights and government integrity were the factors with the strongest correlation with the level of venture capital investments as % share of GDP.
Although I expected a greater variation between which factor was more impactful over the 15 years considered, I can firmly affirm that the hypothesis **H2** is verified.

Business, investment, and financial freedom confirm their positive relationship with even stronger correlations on a per year basis.
A negative correlation between tax burden and the level of venture capital investments as % share of GDP is present on each single year, confirming the findings of Musgrave (1959), King and Rebelo (1990), and Ooghe, Manigart, and Fassin (1991) that tax breaks enhances the supply of funds from VC.
Similarly, higher levels of public spending led to lower venture capital investments, given the always negative correlation between government spending and the level of venture capital investments as % share of GDP. This result confirms Kneller et al. (2001) discovery on the negative impact that government spending had on economic growth. In a follow-up study, Kneller et al. (2004) agreed that increased government spending can reduce long-term economic growth, with the effect being more pronounced in nations with greater levels of government spending.
In addition, the solution suggested by my research for a reduction in the tax burden and government spending to encourage increased venture capital investment supports what Feldstein (1978) claimed concerning excessive government interference that resulted in bad outcomes such as inefficiency, and advocating measures that lowered taxes and government expenditure.

In conclusion, government spending generates the crowding-out of venture capital investors, meaning that the hypothesis **H4** is rejected.

6.4 Findings from the variations of factors and VC investments

The ambitious aim of my research is to try to find a pattern between the variation in factors and the corresponding variation in the level of venture capital investments, so as to be able to predict the level of venture capital investments that is reached for each variation in each individual factor.

In order to do so, I constructed 10 variables to account for the fourteen annual changes in each factor, both as a difference and as a percentage change, as well 1 variable for the annual change in the level of venture capital investments.

However, the regression results are not uniform enough to allow the drawing of firm conclusions when considering the immediate effect of factors change on venture capital investments without lag . In fact, r-square values below the 0.25 threshold or p-value above 0.05 in some cases, which means that the variation in the level of venture capital investment as a % share of GDP is weakly explained by the variation in factor scoring, with a few exceptions, do not allow general conclusions to be established.

Because it takes time for investors to understand the durability and long-term ramifications of changes, the impacts of more economic freedom may not be immediately reflected in investment decisions.

Therefore, I can start by saying that hypothesis **H3.1** is not verified and must be rejected.

Results slightly improves when accounting for 1 year of lag in the change of the level of venture capital investments as % share of GDP.

Table 6.4.1 - Regression results with 1-year lag

YEAR	DELTA FACTOR	R^2	P-VALUE	VC INVESTMENTS AS % SHARE OF GDP
2009 - 2010	Labour freedom	0.6380	0.0324	+ 0.06132 %
2012 - 2013	Tax burden	0.6416	0.0311	- 0.07894 %
	Monetary freedom		0.0292	+ 0.24810 %
2013 - 2014	Government spending	0.6805	0.0393	- 0.17110 %
2014 - 2015	Government integrity	0.4277	0.0497	+ 0.19040 %
	Monetary freedom		0.0415	+ 0.46610 %
2015 - 2016	Labour freedom	0.5951	0.0475	+ 0.28160 %
2016 - 2017	Investment freedom	0.8627	0.0187	+ 0.21460 %
	Property rights		0.0195	+ 0.25330 %
	Monetary freedom		0.0198	+ 0.34650 %
2017 - 2018	Business freedom	0.7798	0.0185	+ 0.27183 %
	Financial freedom		0.0458	+ 0.84258 %
2018 - 2019	Financial freedom	0.6543	0.0485	+ 0.1788 %
	Trade freedom		0.0130	+ 0.8818 %
2019 - 2020	Business freedom	0.8717	0.0261	+ 0.1548 %
	Labour freedom		0.0171	+ 0.1235 %
2020 - 2021	Financial freedom	0.7093	0.0058	+ 1.708 %

As can be deduced from the table above, not all years presented statistically significant results, but only 10 out of 14.

The results of the table can be read as follow: for example, the r-square of 0.8627 and the p-values below 0.05 obtained in 2017 results allows me to say that that year for every 1-point improvement in the scoring of the investment freedom, property right, and monetary freedom factors would have resulted in an increase in the total level of venture capital investment as % share of GDP of 0.2146%, 0.2533%, and 0.3465%, respectively.

For a more complete overview, I also present in the table below the results considering a 2-year lag on the delta of the level of venture capital investment as % share of GDP.

Table 6.4.2 - Regression results with 2-year lag

YEAR	DELTA FACTOR	R^2	P-VALUE	VC INVESTMENTS AS % SHARE OF GDP
2010- 2012	Financial freedom	0.6264	0.0309	+ 0.9606 %
2011 - 2013	Tax burden	0.7506	0.0050	- 0.1092 %
	Property rights		0.0449	+ 0.6636 %
2012 - 2014	Property rights	0.6592	0.0103	+ 0.1956 %
	Government integrity		0.0233	+ 0.1688 %
2013 - 2015	Tax burden	0.7234	0.0424	- 0.0620 %
	Government spending		0.0382	- 0.0441 %
	Financial freedom		0.0453	+ 0.1368 %
2014 - 2016	Labour freedom	0.7057	0.0334	+ 0.0154 %
	Investment freedom		0.0358	+ 0.1052 %
2015 - 2017	Monetary freedom	0.7090	0.0197	+ 0.7648 %
2017 - 2019	Investment freedom	0.7127	0.0414	+ 0.3090 %
	Trade freedom		0.0154	+ 1.134 %
2018 - 2020	Tax burden	0.7975	0.0216	- 0.2799 %
	Labour freedom		0.0098	+ 0.1508 %
2019 - 2021	Tax burden	0.5988	0.0264	- 0.2993 %
	Government spending		0.0425	- 0.0934 %

This table further confirms what we have learned in the previous paragraphs, namely that the tax burden and government spending decrease the level of venture capital investments. For

instance, in the 2019-2021 biennium, for each unit increase in the tax burden and in government spending, the level of venture capital investments as % share of GDP in the 33 countries decreased respectively by 0.2993 % and 0.0934 %.
In conclusion, I think it is possible to argue that some other element to take into account is missing, however, the results still point to factors that with their change explain a variation in the level of venture capital investments as % share of GDP, so the hypothesis **H3.2** and **H3.3** are partially verified when considering 1 and 2 years of lag.

The table below gives a recap of the hypothesis and the result of their verification.

Table 6.4.3 - Recapitulation of the results of the hypotheses

HYPOTHESIS	RESULT
H1: The Index of Economic Freedom by The Heritage Foundation will explain the level of VC investments.	Verified
H2: Each year, the importance of each of the 10 factors will be different over the time horizon considered, shifting from years in which the factor may have been significant to years in which it does not explain the level of venture capital investments.	Verified
H3.1: The annual change in factor scoring will explain the annual change in VC investments in the same year.	Rejected
H3.2: With a lag of 1 year, the annual change in factor scoring will explain the annual change in VC investments.	Partially verified

H3.3: With a lag of 2 years, the annual change in factor scoring will explain the annual change in VC investments.	Partially verified
H4: Government spending have generated a crowding-in effect on venture capital investments.	Rejected

6.5 Entrepreneurs and government implications

The aim of my paper is to bring to the attention of OECD governments and entrepreneurs a comprehensive analysis of various factors from different spheres of action so that they have a full picture of what and how actions should be taken to foster the development of a thriving ecosystem for start-ups, entrepreneurs, and venture capitalists. In fact, venture capitalists require a healthy environment to assist General Partners in developing their businesses, attracting managers, closing agreements, and arranging the next financing round or exit.
Actions by the government must be specifically targeted at start-ups, taking into account their specific needs, otherwise there is the risk to implicitly establish policies with incumbents' requirements and conditions in mind, rather than start-ups' ones, resulting in delays or non-implementation of horizontal structural changes that may aid start-ups.

The results of my research highlight the indispensability of government integrity with strong protections for the propriety rights of start-ups and entrepreneurs.
Government integrity is critical for entrepreneurs and startups because it creates a fair and transparent business climate that fosters trust, stability, and growth. The integrity of a government generates confidence and trust in the entrepreneur and venture capital investor, as well as establishing an idea of the government's predictability and stability.

Moreover, a righteous government entails a fair protection of property rights, which allows entrepreneurs to develop their ideas without the risk of other entrepreneurs unfairly appropriating them, just as it protects entrepreneurs from the risk of their ideas being appropriated by venture capitalists as highlighted by Ueda (2004).
Therefore, if governments want to attract entrepreneurs to develop their start-ups within their borders, as well as attract domestic and foreign investors, they must first of all establish their own stability and integrity.
On the other hand, entrepreneurs must go in search of countries where governmental stability guarantees that they can develop their ideas with the right protections and stimuli.
However, it is fair to note that developed countries should already ensure governmental stability and integrity, so they should focus more on the other factors such as business, monetary, investment, and financial freedom. Thus, improving government integrity and the protection of property rights should relate to developing governments, with entrepreneurs who want to invest in those countries having to monitor their progresses.

The last significant and important result of this paper is the confirmation of a crowding-out effect of venture capital investors as a result of government spending and the negative effect of a high tax burden. The basic idea of governments is that if the innovative waterworks get blocked, increasing upstream pressure by proving funds will fix the problem.
Although venture capital is often regarded as a crucial predictor of startup development, most national and subnational policy actions just try to increase the supply of this financing stream. However, the absence of significant economic dynamism in an economy and the resulting chances for growth renders securing this predicted growth ineffectual.
With the results of my research in mind, governments need to create a thriving ecosystem not by investing directly in start-ups or venture capital funds, because the lack of development is not related to the lack of money, but to the lack of the factors mentioned above.
My findings demolish the justification for avoiding the far more difficult effort of releasing entrepreneurs from the restrictions that stifle their growth.

7. Conclusions

7.1 Discussion

This study, at least according to the results of the literature review carried out, is the first to include the factors of The Index of Economic Freedom by The Heritage Foundation in the analysis of venture capital investments.

The results of the study confirm that The Heritage Foundation's Index of Economic Freedom explains the amount of VC investments across the time range studied. In particular, over the time span covered, the relevance of each of the ten factors varied from year to year, ranging from years in which the factor has been significant to years in which it does not strongly explain the amount of venture capital investments.

However, this paper does not fully explain how variations in the scoring of each factor can determine a variation in the level of venture capital investments in the same year with immediate effect, so it is possible to identify which variations of the factors were more decisive and investigate them to understand which were the surrounding macroeconomic conditions that allowed that factor to be more impactful.

Nevertheless, it has been acknowledged that the effects of an improvement in the scoring of a factor don't result immediately in an improvement in the level of venture capital investments, but it takes some time, as shown by the satisfactory results that begin to be seen with 1 and 2 years of lag.

While changes in these factors can have an influence on different parts of the economy, including venture capital investments, it is important to clarify why changes in the scoring of The Index may not instantly translate into changes in venture capital investments. Investor trust is critical in venture capital investments. Regardless of a country's improved economic freedom score, it takes time for investors to become aware of and confident in the developing regulatory situation. Investors must evaluate the long-term repercussions of regulatory changes, assess stability, and appreciate the impact on their assets.

In addition, venture capital investments typically correspond to investment cycles and trends that are unrelated to changes in economic freedom ratings. Market demand, technical improvements, and economic cycles all have a stronger impact on investing behaviour. As a result, it may take some time for these cycles to align with increased economic freedom ratings, resulting in an increase in venture capital investments.

Regardless of whether a country's economic freedom score improves, the practical implementation of regulatory reforms and their consequences on the business climate may be delayed. This implementation frequently needs further legislation amendments, administrative processes, or regulatory infrastructure upgrades. These processes might stymie the timely realisation of the expected advantages and, as a result, the following increase in venture capital investments.

As pointed out by Lerner (2009), the establishment of a venture capital industry is a long-term investment that requires long-term commitment from politicians because tangible results take many years to achieve, and the succession of different governments makes programmes aimed at assisting VC markets ineffective or the effects further delayed.

Using Israel as an example, it can be seen that the process of becoming one of the world's major centres of start-ups began well before the effects that are possible to witness in recent years. In fact, two of the most successful programmes, Technological Incubators Program and Yozma Program, were launched in 1991 and 1993 respectively.

As another example, start-ups and venture capital ecosystem in Canada in 2020-2021 is benefiting from government decisions made three/four years earlier.

In conclusion, it can be firmly stated that the effects from changes in economic freedom take longer than the time considered by my analysis to show clear and explanatory results in the venture capital investments level.

7.2 Limitations and future research directions

This research is not without limitations, nonetheless it provides direction and insights for future research and improvements.

In particular, the study is limited to shedding light on which factors of The Index of Economic Freedom by The Heritage Foundation can be most leveraged to increase the level of investment. Therefore, future studies can directly delve into those factors that have been shown to have the greatest weight and impact on the level of venture capital investments.

Another limitation of the study is that it has used the factors of The Index of Economic Freedom by The Heritage Foundation that are not exclusively specific to the world of start-ups and venture capital, but also include them.

Hence, future research can narrow the point of view by exclusively analysing the factors which only have an impact on start-ups and venture capital, or they can focus on creating an index with start-ups-tailored factors. Despite the challenging endeavor that this research might represent, this study can serve as a strong basis.

Furthermore, in a few years' time, the study presented in this paper can be repeated, so that more data will be available, without limiting the analysis to the effects with 1 or 2 years of lag but being able to carry out analyses with more years of lag and explain better the underlying phenomenon.

Finally, although the OECD countries share similar growth targets, this research does not take into account the intrinsic differences of each country and uses the same logic with all of them, as if only 1 fictitious country were taken under analysis, so future research could focus on a smaller cluster of countries, sharing a closer geographical and cultural distance, in order to provide more specific results that closely match the nature and needs of each country.

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