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Recovery through innovation:

the relationship between a recession and innovative

entrepreneurship

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Abstract

Entrepreneurship and innovation are key factors in a country's economic performance and long-term economic recovery after a downturn. There is literature on the effects of a recession on entrepreneurship and also substantial literature on innovation and its effect on economic performance. However, literature does not give a clear image of the effects of such a downturn on innovative entrepreneurship. It could be interesting to gain insight on the effect of economic downturns on innovative entrepreneurship, because innovative entrepreneurship might be important for economic recovery. This thesis investigates the relation between a recession and innovative entrepreneurship. On a dataset containing data on 38 different Western countries over the period from 2006 till 2012 regressions were performed. Although the regressions show a positive relation between recession and entrepreneurship, the relation between recession and innovative entrepreneurship is negative. Thus, although entrepreneurship increases during a recession, there is a decrease in innovative entrepreneurship. This suggests that the increase in entrepreneurship due to a recession is most likely necessity driven.

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Introduction

The world is currently dealing with the COVID-19 pandemic. The measures taken to stop the spread of COVID-19 could leads to a large economic crisis and a recession. The first signs of this are already visible with China's economy shrinking for the first time since recordings started in 1992 (Brasher, 2020). Some predictions from the Netherlands Bureau for Economic Policy Analysis (CPB) and the IMF suggest that this next recession will be worse than the Great Recession from 2007 till 2009 (Nauta, 2020 & Trouw, 2020). The coming years countries will be working to recover from this new recession. Entrepreneurship and innovation are key factors in economic growth (Sappin, 2016). Entrepreneurs are even said to be the key to economic recovery (Forward, 2020). Therefore, knowing what will happen to entrepreneurship and innovation during a crisis can help both governments and business anticipate their next steps and set up strategies to survive the recession. This is not only relevant for this new recession but also for future recessions as recessions are inevitable as part of the business cycle.

Entrepreneurship can be defined as the ability and willingness of individuals to perceive and create new economic opportunities and to introduce their ideas in the market in the face of uncertainty and obstacles (Wennekers & Thurik, 1999). Thus, entrepreneurship is a behavioral characteristic and is not equal to small business, mainly because entrepreneurship is not limited to starting or operating a small firm. Think of intrapreneurs or corporate entrepreneurs. Entrepreneurship can also entail self-employment. Self-employment is when the entrepreneur not only runs the business but also works in their business, self-employment can also mean working as a freelancer (Wennekers & Thurik, 1999). This research will look at entrepreneurs who are running a business or have started a business. Entrepreneurship can be necessity or opportunity driven. Necessity-driven entrepreneurship mostly starts from unemployment. These entrepreneurs have no other choice but to start a business to earn money. Opportunity driven entrepreneurship involves finding and exploiting business opportunities. These entrepreneurs usually start from employment and start a business when they see a good opportunity they can exploit (Fairley & Fossen, 2018). This distinction is specifically important when looking at entrepreneurship during a crisis, as entrepreneurs with different motives might react to recession differently. Getting more insight into the different motives of entrepreneurs can help in creating policies or strategies of how to deal with crisis in relation to entrepreneurship. With the ideas formed in this thesis, entrepreneurs and governments can gain new insights on what happens to innovative entrepreneurship during a crisis.

This thesis will focus not only on entrepreneurship but also on innovation and innovative entrepreneurs. One definition of innovation is the introduction of a new product or service into the market (Merriam-Webster, 2020). Innovation can happen at the product or process level and can be incremental or radical. Each different type of innovation has its own consequences on economic recovery after a recession. Incremental innovation enhances an existing product or process, while radical innovation concerns a completely new product or process that has a significant impact on the market or economic performance of firms. An innovative entrepreneur is an entrepreneur who innovates, which can be done by introducing new products or services into the market or by innovating a process in the supply chain. Innovation is highest in countries with an innovation-driven economy, these countries are most likely to have a large share of innovative entrepreneurship. Most Western countries are developed countries with a sophisticated economy, these economies are mostly innovation-driven or moving from efficiency-driven to innovation-driven.

Through time economies have changed. At the beginning of the 20th century, there was a period of creative destruction. During this time many firms were scaling up and expanding. Creative destruction usually happens when entrepreneurs react to new opportunities in technology, resulting in activities that can undermine existing firms and disrupt the market (Schumpeter, 1911 (1934); Schumpeter, 1942; Von Tunzelmann, 1995). From the mid-70s to the 90s there was a switch from creative accumulation to creative destruction, as described by Schumpeter, with a rise in innovation breakthroughs (Carree & Thurik, 2003). Creative accumulation usually happens when industries demonstrate cumulative learning processes and incremental innovations, often driven by big firms building on existing qualities. At the end of the last century, there was a trend towards downsizing of large firms and a rise in start-ups and entrepreneurship and with that a revival of creative destruction. This has been attributed to new technologies that reduce the importance of economies of scale, deregulation and privatization and concentration on core competencies of large firms leading to downsizing (Carree & Thurik, 2003). Currently, entrepreneurship is in decline (Naudé,2019). Moreover, firms are scaling up again, however, a new economic crisis could turn this around. A move to smallness can result from fundamental changes in the world economy such as globalization, changes in the character of technological process, increase in labor supply and relaxation of entry regulations in markets (Carree & Thurik, 2003). An increase in unemployment due to recession, means that labor supply increases. The individuals supplying this labor can choose between looking for a new job, staying in unemployment or starting their own business.

The economy is one of the most important factors affecting entrepreneurship (Devece et al., 2016). In times of crisis and recession entrepreneurship is very important for the recovery of the economy (Forward, 2020). Entrepreneurs create a lot of jobs, are a source of competition, they promote regional trade and development and they contribute to technology transfer (Papaoikonomou et al., 2011). And especially innovative entrepreneurship plays a central role in economic development because innovative entrepreneurship leads to higher value-added jobs and wealth creation (Szabo & Herman, 2012). Entrepreneurship is also important for innovation and improving competition, and through that stimulating economic growth.

At this moment it is not fully clear what effect a recession has on entrepreneurship. Entrepreneurs could thrive in a destabilized economy, but on the other hand entrepreneurs might suffer disproportionately in a crisis (Bourletidis & Triantafyllopoulos, 2014). They could end up in a vicious cycle of reduction of sales, lower-income, payment delays and eventually bankruptcy (Papaoikonomou et al., 2011). On the other hand, recessions can lead to an increase in entrepreneurship. Recessions lead to lower employment and thus fewer alternatives for entrepreneurship, which means that the opportunity costs of entrepreneurship decrease which could lead to an increase of entrepreneurship (Simón-Moya et al., 2016). So, although, a recession is a very difficult time for entrepreneurs with lower income, on the other hand, the opportunity costs for entrepreneurship are lower which makes it more attractive to become an entrepreneur.

There is no one commonly agreed definition of recession, but there is some agreement as to what recession entails. It is commonly agreed that a recession refers to a period of declined economic activity (Claessens & Kose, 2009). According to the National Bureau of Economic Research (NBER), a recession is when there is a significant decline in economic activity across the economy that lasts for more than a few months. This decline in economic activity usually can be seen in GDP, employment and other indicators. NBER assesses if there is a recession by testing three criteria, namely depth, diffusion and duration. In general, all three criteria have to be met for the NBER to declare a recession, but extremes in one criterion can offset other criteria (NBER, 2020). Furthermore, Claessens & Kose (2009), state that a period of economic decline can be defined as a recession when a country's real GDP shows a decline for at least two quarters. Recessions can be caused by many factors; a recession can happen due to price changes in inputs for goods and services such as energy and oil. A recession can also follow from monetary or fiscal policy. The 2008 recession had its roots in the financial market. There were sharp increases in asset prices and credit expanded at a high speed, leading to an accumulation of debt. To meet their debt obligations, households and companies spent less on consumption and investment, reducing economic activity and slowing the

economy down (Claessens & Kose, 2009). While a decline in GDP can be a good measure of recession in hindsight, unemployment is a good measure for a recession both in hindsight and for the future (Nunn, 2020). An increase in unemployment can give an almost real-time look into the state of the labor market. Moreover, unemployment data is easily accessible. Therefore, this thesis will use unemployment as a proxy for the 2007 recession and will focus on the period from 2006 till 2007.

For an entrepreneur to survive during a recession and crisis, the entrepreneur needs to be very committed to their business. Compared to employees, entrepreneurs are willing to work longer hours and work more efficiently since their income is closely related to their effort (Thurik et al., 2008). In general, opportunity entrepreneurs are more committed to their business than necessity entrepreneurs and have a better education in general (van der Zwan et al., 2016). This can be associated with better performance and longer survival of opportunity-driven businesses (Simón-Moya et al., 2016). Some papers such as Devece et al. (2016) even show that opportunity-driven enterprises perform better than necessity driven enterprises during a crisis.

Carree and Thurik (2003) found an absence of literature linking entrepreneurship to national economic growth. There are several explanations or this such as a lack of theoretical frameworks, measuring constraints and reverse causality. This thesis will try to fill this gap in literature regarding the link between entrepreneurship and economic growth by looking at the relation between recession and innovation and innovative entrepreneurship at the national level. This research will try to determine how a recession relates to entrepreneurship and innovation. This will be done by answering the following research question:

How does an economic recession relate to entrepreneurship and innovation?

To help answer this research question, this thesis will look at several topics. In this thesis, first, these topics will be discussed. And eventually, the main research question will be answered, based on the research that will be done. These topics are:
- The relation between recession and to entrepreneurship.
- The relation between recession and opportunity and necessity entrepreneurship.
- The relation between recession and innovation.
- The relation between recession and innovative entrepreneurship.

Based on these subtopics and a review of the literature, four hypotheses will be formed. These hypotheses will be tested with linear regressions. For these regressions a database was formed, containing data on 37 Western countries over a period from 2006 till 2012. This time frame composes the buildup to the 2008 recession and the recovery afterwards, thus it gives a good look at what happened during the last recession and its aftermath. This thesis focuses on Western countries as these economies are mostly innovation-driven or progressing to become innovation-driven.

With the findings of this research, recommendations can be made for entrepreneurial strategies, both for entrepreneurs and the government. The subtopic regarding necessity driven and opportunity-driven entrepreneurship will help determine to which type of entrepreneurship policies and strategies should be aimed to help entrepreneurs during a crisis. An increase in necessity-driven entrepreneurship can imply an increase in entrepreneurs who merely want to earn enough money to pay their bills. These entrepreneurs might not be as motivated as entrepreneurs who are trying to enter new process or product ideas in the market and therefore might not contribute a lot to economic growth and recovery. Whereas an increase in opportunity-driven entrepreneurs could mean an increase in new and innovative products and processes, which could improve a country's economic growth and recovery. Whether innovative entrepreneurship increases or decreases during a recession is not simply good or bad. Moreover, knowing whether it increases, or decreases can help in creating specific policies and can help enterprises form strategies to survive a recession. Even if innovative entrepreneurship declines during a crisis, it is still important for the economic recovery of a country therefore it might still be important to support innovative entrepreneurship during a recession.

In the following sections of this thesis, the theoretical background will firstly be explained, this theoretical background will bring forth the hypotheses to be tested. Next, the methodology will be explained, then the results of the data analysis will be discussed. The thesis will end with a conclusion and discussion on the findings.

Theoretical Background

This thesis will try to answer the question of how a recession relates to innovative entrepreneurship. To form hypotheses that can be used to determine the different relationships, a review of literature will be given. This review is divided into different sections relating to the main research question and the related subtopics that were described earlier. Based on the literature, after each section, a hypothesis will be formed. Each hypothesis will relate to one of the subtopics. First, the focus is on how a recession relates to entrepreneurship. Therefore, the first section will look at the literature on the relationship between recession, entrepreneurship, economic growth and the business cycle. The business cycle is the down- and upward movement of the GDP of a country around the long-term growth trend of the GDP, a business cycle covers a period containing both a boom and a recession. The relationship between the entire business cycle and entrepreneurship is important as well. The second section will discuss literature concerning necessity and opportunity entrepreneurship, to assess how a recession relates to opportunity and necessity entrepreneurship. Next, the focus will be innovation, thus the third section will look at innovation and recession. This chapter will end with discussing literature on the relation between innovative entrepreneurship and recession. Based on this theoretical background, hypotheses will be formed that will be tested later on in this thesis.

It is agreed among economists that entrepreneurship is a key economic driver and can help achieve long term recovery, but SMEs face a lot of hardships during recessions (Papaoikonomou et al., 2011; Zsuzsanna & Herman, 2012; Garba 2012; Van Stel et al., 2005). Unfortunately, the literature is ambiguous as to what the relation of unemployment and recession is to entrepreneurship. On one side there is evidence for recession increasing entrepreneurship, but on the other side, there is also evidence for recession leading to a decrease in entrepreneurship. This thesis will look further into the effect of unemployment on entrepreneurship.

Recession and entrepreneurship

Traditionally recession, and from that unemployment, is said to affect entrepreneurship in two ways. These are the prosperity-pull hypothesis and the recession-push hypothesis. The recession-push hypothesis states that high unemployment, as is common during recession, reduces the chances of finding employment, leaving people with no other option than to start a business to survive. Therefore, it can be said that a recession pushes people into entrepreneurship, showing a positive relationship between unemployment and entrepreneurship (Parker, 2004). The prosperity-pull hypothesis, in contrast, suggests a negative relationship between unemployment and entrepreneurship. This hypothesis states that when unemployment is high, market demand for

goods and services of entrepreneurs is low, increasing the risk of bankruptcy and reducing entrepreneurial income. This can pull people out of entrepreneurship. Moreover, during these times entrepreneurship can be seen as riskier because when a business fails there is a smaller chance for the entrepreneur to fall back on paid employment (Casson et al., 2008). This relationship also works the other way around, in economically prosperous times, the market demand for goods and services of entrepreneurs is high and the chance of bankruptcy is reduced. Entrepreneurial income is high, and the risk of entrepreneurship is low. Thus, prosperity will pull people into entrepreneurship.

Economic recession and prosperity are connected to economic development as well. Therefore, economic development in a country can help explain the level of entrepreneurship in a country. Porter et al. (2002) and Porter (1999) divided economic development into three stages; factor-driven stage, efficiency-driven stage and the innovation-driven stage. These three stages are related to entrepreneurship levels in a country. A country that is more developed or at a further stage might have more or less or a different kind of entrepreneurship then a less developed country. The first, factor-driven stage is characterized by high entrepreneurship, especially in non-agricultural fields (Acs et al., 2008). In this stage a country mostly competes on unskilled labor and natural products, in this stage the returns to wage work are likely to be lower than the returns to entrepreneurship as most wage work is unskilled manufacturing work. As a country moves to the efficiency-driven stage, there is a decrease in entrepreneurship as the returns from wage work increase and only the most efficient managers run companies and because the economy changes from agricultural to more industrial development and more automation. The innovation-driven stage shows an increase in entrepreneurial activity again. This increase was prevalent during the 70s and 80s and has three reasons. The first is that in the innovation-driven stage, an economy is characterized by a smaller share of manufacturing activity and a larger services sector. The second is that technological innovation happened mostly in industries where entrepreneurship plays a key role. Innovations in areas such as telecommunication might have increased the returns to entrepreneurship. The last reason is that a high elasticity of factor substitution makes it easier to become an entrepreneur, this means that the managerial talent required to start a business is low (Aquilina et al., 2006). This thesis will look at countries that are at the innovation-driven stage or are moving from the efficiency-driven to innovation-driven stage. These countries are more likely to have a mix of different entrepreneurship motives and generally have more innovation on a country level. Simón-Moya et al. (2016) found that the economic environment is very important for the creation of business opportunities. The economic environment changes as economic development moves from one stage to the next. The economic environment also changes during a recession and the recovery

from a recession. High economic growth creates opportunities for employment and new firms. However, an abundance of available jobs and a high level of social security mean there is a high opportunity cost of starting a business. During a crisis, there are not a lot of available jobs and opportunity costs of starting a business are low, a crisis can push people into entrepreneurship. This way entrepreneurship can be a response to a crisis. This can also apply to a business established before the crisis, during a crisis the opportunity costs of continuing are low even for a business that is not performing well. During economic growth the opportunity costs of stopping the business are low. As seen, entrepreneurship is also shaped by the economic environment and, as part of the environment, unemployment.

Koellinger and Thurik (2012) showed that on a global scale recoveries and booms have been preceded by a rise in entrepreneurship. This can give insight into entrepreneurship in relation to the business cycle. Cyclical entrepreneurship typically reaches its maximum before a cyclical boom in GDP reaches its maximum. This suggests that on a global level, entrepreneurship leads the business cycle. These global fluctuations in the business cycle Granger-cause increase in GDP and they also predict future unemployment. GDP and unemployment do not predict the entrepreneurial cycle. This leads to the conclusion that an increase in global entrepreneurship is followed by a recovery of the world economy and a decrease in unemployment. This is in line with other research that states that entrepreneurship contributes to recovery after a recession (Papaoikonomou et al., 2011; Zsuzsanna & Herman, 2012; Garba 2012; Van Stel et al., 2005). This shows that entrepreneurship can positively contribute to economic recovery after a recession. The pro-cyclical relationship between entrepreneurship and the business cycle, could argument that entrepreneurship declines during an economic downturn, as it moves along or ahead of the business cycle. Koellinger & Thurik (2012) found, however, that their aforementioned results on the global level do not hold on the national level. At the national level, unemployment has a positive effect on entrepreneurship. This could mean that entrepreneurship would increase during recession.

Bourletidis and Triantafyllopoulos (2014) studied the effect of a crisis on Small and Medium Enterprises (SMEs) in the commerce sector in Greece. A big part of entrepreneurs are owners of SMEs. These SMEs have limited resources and are dependent on a small number of customers and banks, this means that they could suffer greatly during a crisis. SMEs in this sector lost half their sales volume during the 2007 crisis. This paper thus gives a good indication of what could happen to entrepreneurs during a recession. However, SMEs are also more flexible and can adapt faster than large multinationals. On a larger scale the aggregate perception of a crisis, context and social

structure of entrepreneurs in a country can shape what happens to entrepreneurship on a national level during a crisis. This can help determine whether entrepreneurship is most likely to increase or decrease during a recession.

In general, literature shows ambiguity when it comes to the relationship between recession and entrepreneurship. There is evidence for both an increase and a decrease in entrepreneurship during a recession, the prosperity-pull and recession-push hypotheses. For developed countries Van Stel et al. (2005) found that entrepreneurial activity helps the commercialization of knowledge and healthy development of the business population. It was also found that in developed countries, the prosperity-pull hypothesis is stronger meaning that fewer people will get into entrepreneurship during a recession (Casson et al., 2008). Based on this literature, this thesis expects to see a decline in entrepreneurship in years of economic downturn. Therefore, the first proposed hypothesis is:

H1: A recession negatively relates to entrepreneurship.

Recession and Opportunity and Necessity Entrepreneurship

When looking at the relationship between recession and entrepreneurship, it is relevant to distinguish the different motives for entrepreneurship. The motives of entrepreneurs can be necessity or opportunity. Different motives lead to different types of entrepreneurship.

Dawson and Henley (2011) studied why people report choosing self-employment. Their focus was mainly on the pull and push motives, distinguishing between men and women. This is relevant because it focuses on motives to become an entrepreneur, these motives may be related to innovativeness. The authors investigate if the simple push and pull hypotheses are too simplistic since people might have both pull and push motives to enter entrepreneurship. One extreme of the willingness spectrum of becoming an entrepreneur is a positive motive of self-efficacy, the other extreme of the spectrum is the need to make a living and being unable to find paid employment. Whether entrepreneurship is necessity or opportunity-driven, determines whether entrepreneurship can be labelled as something positive or negative. When entrepreneurship is driven by the necessity to earn money but no other opportunity than entrepreneurship, it can be seen as something negative as these entrepreneurs are generally only focused on making money. But if entrepreneurship is a choice to exploit opportunities in the market, it can be seen as something positive as the exploitation of opportunities might lead to the creation of more business opportunities. The research in the paper by Dawson and Henley (2011) shows that for a range of

13% to 48% of the respondents their motivations could be labelled as necessity. However, direct necessity motivations are only reported by 13% of the respondents. The big range of uncertainty comes from motivations that might contain necessity elements. This can be seen as evidence that there is not a clear line between necessity and opportunity entrepreneurs, but that it is more a mix of motivations. Thus, an entrepreneur can have multiple motivations and his drive to be an entrepreneur can come from both the necessity to earn money (necessity-driven) and the exploitation of a business opportunity (opportunity-driven). However, most of the time the entrepreneur will have one dominant motive (Dawson & Henley, 2011).

The motives to become an entrepreneur can be influenced by the economic environment. As the degree of economic growth increases, necessity becomes less of a motivator for entrepreneurship as unemployment decreases (Baptista et al., 2013). Whereas, when unemployment increases, relatively more entrepreneurs start from necessity (Simon-Moya et al., 2016). Entrepreneurship can be an escape for people who have lost their job. This means that the relationship between entrepreneurship and the business cycle can be different on the global level than on the national level. There are several ways to explain the differences between the national and global level. Mainly, motivation plays a big role in the impact on the macroeconomy. Non-marginal, innovative entrepreneurs are entrepreneurs who react to the presence of opportunities rather than looking for a way to make money because they lost their job or have no other option. Business opportunities are related to new technologies, development or changes in globally important commodity prices. Thus, non-marginal entrepreneurship is more likely to show a peak when business opportunities arise at a global level. Marginal entrepreneurs are more likely to react to current national unemployment rates. Innovative, opportunity-driven entrepreneurship is more likely to react to global fluctuations and marginal, necessity driven entrepreneurship is more likely to react to national fluctuations (Koellinger & Thurik, 2012). Deli (2011) found a positive relationship between unemployment and necessity entrepreneurship. Meaning that as unemployment rises, more entrepreneurs will be motivated by necessity to earn money rather than exploiting a business opportunity. Another finding by Simón-Moya et al. (2016) is that the necessity to opportunity rate grows during a crisis. This means that during a crisis the number of necessity entrepreneurs relative to opportunity entrepreneurs is larger. Necessity entrepreneurship is also referred to as survivalist entrepreneurship, as it can be someone's only way to survive. This type of entrepreneurship can be characterized by low initial investment and industries with low entry barriers. Despite the positive relationship between unemployment and necessity entrepreneurship, opportunity entrepreneurs are found to perform better.

This is also visible when looking at the difference between developed and developing countries. This can help in determining the effect of a recession, or high unemployment, on innovative entrepreneurship and the ratio between necessity and opportunity entrepreneurship. As innovative entrepreneurship is more likely to be opportunity driven. Simón-Moya et al. (2016) found that developing countries have more necessity entrepreneurs and developed countries have more opportunity entrepreneurs. Developing countries usually have higher unemployment relative to developed countries, meaning that relatively more people have no other option than entrepreneurship to earn money. Opportunity entrepreneurs are generally more committed to entrepreneurship, more motivated and have better education and experience (Simón-Moya et al., 2016). This could mean that they are more likely to innovate and try out new ideas. This was also found by Devece et al. (2016), who found that opportunity entrepreneurs have more motivation, which leads them to run their business better and increases firm performance. During a crisis, the total number of businesses can decrease, but those firms that do prevail perform better (Devece et al., 2016).

Baptista et al. (2013) examined whether the background of the founder influences firm survival in the early years after startup, focusing on necessity entrepreneurship. Firm creation involves decisions based on forecasts because the would-be entrepreneur has to evaluate whether an opportunity will be profitable enough to offset the opportunity costs. The entry decision is mainly driven by two characteristics: the plentifulness of opportunities and the availability of resources. With prior knowledge, entrepreneurs can recognize opportunities more easily and have a better capability of exploiting these opportunities. It can be said that the success of a firm is shaped by the prior experiences of the founders. Just as interrupted careers translate into depreciation of human capital stocks, previous experience is likely to depreciate during interruptions such as unemployment spells. This means that entrepreneurs who start from unemployment are less likely to recognize opportunities and have fewer capabilities to exploit them. This research tries to establish whether different sources of human capital play a different role in early survival of entrepreneurs. For opportunity-driven entrepreneurs, human capital increases the probability of surviving in the first three years after startup. While for necessity entrepreneurs, only previous entrepreneurial experience increases survival chances. Opportunity recognition and evaluation demands knowledge about several factors involved in starting the business. Necessity entrepreneurs are less likely to look for opportunities and evaluate them as they are just looking for a way out of

unemployment. The motivation to become an entrepreneur also differs relative to the stage of development of a country.

So, in general, opportunity entrepreneurs perform better, even during a crisis. However, as unemployment increases, relatively more entrepreneurs start from necessity (Simon-Moya et al., 2016). During a recession, unemployment will increase leaving more people with no other option than entrepreneurship. Therefore, the second proposed hypothesis is:

H2: A recession positively relates to the ratio between necessity driven and opportunity-driven entrepreneurship.

Recession and Innovation

Another important aspect of innovative entrepreneurship, besides entrepreneurial motives, is innovation. This section will go into the relationship between innovation and recession. It is important to understand this relationship in order to understand the relationship between recession and innovative entrepreneurship. Whether or not there is any relation between the economic environment and innovation can help construct a good hypothesis for this thesis regarding innovation and recession. Ever since the beginning of the Industrial Revolution, the global economy has made big moves forward due to innovations. Each wave of innovation has a positive effect on productivity, economic growth and business opportunities (Matuzeviciute et al., 2017). Innovation can lead to job creation and higher wages for skilled workers, but innovation can also increase unemployment and negatively influence skilled and unskilled workers. Innovation is a source of both job creation and job destruction (Matuzeviciute et al., 2017). In the past three decades, the attention was mostly turned towards skill-biased innovation. It is argued that developed countries are more efficient in their use of skilled labor because developed countries are abundant in skilled-labor and they choose innovations suitable for skilled-labor. Skill-based innovation reduces the demand for routine low-skilled jobs that can be computerized (Matuzeviciute et al., 2017).

Filipetti and Archibug (2011) investigated to what extent innovation investment is affected by characteristics of National Systems of Innovation and demand. There is a general belief that innovation is not related to economic crisis but is a source of economic variations. With this paper it can be determined if a relation between innovation and recession can be expected or not in this thesis. There are two general hypotheses concerning innovation and the business cycle: innovation is either cyclical or counter-cyclical (Filipetti & Archiburg, 2011). If innovation is cyclical, a recession will

lead to a reduction in innovation. If innovation is counter-cyclical, a recession will lead to an increase in innovation. In practice we see some firms persisting in the innovation investment during downturns and others reducing their innovation investments during downturns. A firm's persistency of innovation investments can be influenced by the national setting. National institutions determine the structural conditions of countries and their ability to respond to changes. The National System of Innovation approach frames innovation and how firms act within the national institutional context (Filipetti & Archiburg, 2011). This study by Filipetti & Archiburg (2011) found that even though most companies were able to maintain their innovation investment during the recession, most were not able to expand it. The authors found that a lot of companies maintained their innovation investment, but the number of firms able to expand their innovation investment has shown a big decrease. This trend is not the same for all European countries. In the new member countries in Central and Eastern Europe, the decrease in the number of firms able to expand their innovation investment is the biggest. The authors found that countries with stronger NSI were less affected. The main conclusion of this research is that the ultimate effect of a recession on innovation can differ across countries (Filipetti & Archiburg, 2011).

Milic (2013) looked at business strategies for entrepreneurs during a crisis, this paper is relevant to determine what the current crisis strategies are and whether or not they are successful towards firm survival during a recession. He found that the basic firm strategy during a crisis is to cut down costs, this is a reactive approach. This strategy is usually successful in the short run but can cause damage to the firm in the long run. Because a big part of cost reduction for firms is decreasing research and development budgets, innovation will likely decrease when budgets are cut while the main factor to permanent recovery is innovation. Innovation can be radical or incremental. Radical innovation usually happens when disruptive ideas and technologies are implemented structurally changing the market. The structure of innovation could change during a crisis as it is found that incremental innovation is easier to implement and demands less capital, thus it is easier to implement during a crisis. However, radical innovation is said to be better for economic recovery during a crisis (Milic, 2013). So, it can be concluded that, according to this study, recession does not have an impact on the amount of innovation but more on the structure of innovation.

Panatgiotis et al. (2015) suggested culture as a strategic instrument for innovation. Their research showed that countries who were top innovators before the 2008 recession, were still top innovators in 2013 regardless of changes in macro conditions due to the recession this could mean that recession did not have a significant effect on innovation. The authors did find that the culture in a

country affects innovation. Thus, an innovative culture or a culture were innovation is seen as a good thing, boosts innovation (Panatgiotis et al., 2015). This confirms that culture is important for innovation at the national level and can mean that recession might not have a big effect on innovation in a country as culture might be more influential.

The economic environment of a country affects innovation on the national level, in large firms and SMEs. Through innovation, SMEs and entrepreneurs can drive economic growth and technological progress in a country. A country's level of innovation depends on the culture in that country but more so on the culture, leadership and strategy within a business (O'Regan et al., 2006). The economic environment in a country also plays a role, most firms are not able to expand their R&D investment during a crisis (Filipetti & Archiburg, 2011). Therefore, the third proposed hypothesis is:

H3: Unemployment negatively relates to innovation.

Recession and Innovative Entrepreneurship

Innovation and entrepreneurship play a crucial role in reaching economic development, job creation and growth of wellbeing, this has also been acknowledged in literature (Papaoikonomou et al., 2011; Zsuzsanna & Herman, 2012; Garba 2012; Van Stel et al., 2005; Xie et al., 2013). Normal, marginal entrepreneurship mainly creates jobs, where innovative entrepreneurship leads to higher value-added jobs and wealth creation. The effect of innovative entrepreneurship on economic growth depends on the development stage of a country (Zsuzsanna & Herman, 2012). These stages were introduced by Porter et al. (2002), the stages are the factor-driven stage, efficiency-driven stage and the innovation-driven stage. Getting to a higher level of economic development means reaching a higher level of national competitiveness. Economic development depends on innovation and innovation capacity. Thus, by stimulating innovative entrepreneurship, firms and governments can enhance economic development in a country (Zsuzsanna & Herman, 2012).

Romero and Martínez-Román (2011) shed additional light on the most efficient strategy to support innovation in small businesses and entrepreneurs. The authors found that the external environment is one of the key factors determining innovation in a country.

Government policies is another factor connected to recession that is relevant for innovative entrepreneurship. Innovative entrepreneurship support infrastructures (IESI) are policies that encourage entrepreneurship and innovation. Two of the most popular instruments are innovation

centers and incubators, a third infrastructure is universities. IESIs have become more attractive to academics and policymakers over recent years. Innovation and entrepreneurship are very important to create well-being and growth (Roig-Tierno et al.,2015). Roig-Tierno et al. (2015) focused on young innovative companies (YIC). They found that there is not one single configuration that leads to YIC growth, moreover, it is a mix of the three infrastructures that help YICs grow. Thus, policymakers should encourage firms seeking help from all three infrastructures to benefit from the wide range of support services that these infrastructures offer. Also, the degree of innovation affects job creation when firms use incubators.

The economic environment can positively affect innovative entrepreneurship. If support is easily available and there is a stable economy, it might be easier to start for innovative entrepreneurs. Another factor that might encourage innovative entrepreneurship is government support. During a crisis, government support might be less available due to budget cuts and the economy is not stable, this could be negative for innovative entrepreneurship. With enough support innovative entrepreneurship can be successful, however during a crisis there could be less money available to support innovative entrepreneurship, firms could be less willing to invest in innovation and the economy is not as stable as during an economic boom, these factors could mean that during a recession innovative entrepreneurship declines. Therefore, the fourth proposed hypothesis is:

H4: Unemployment negatively relates to innovative entrepreneurship.

Data & Methodology

The research is done from a quantitative approach with panel data. The dataset combines data from different databases, namely Global Entrepreneurship Monitor (GEM), OECD, World Economic Forum and World Bank. This research will be looking at several Western countries over the period from 2006 to 2012, this period contains the last economic crisis and the recovery after the 2007 recession. This means that the dataset contains all EU member states, Switzerland, Scandinavia, Iceland, Turkey, United States of America, Canada, Australia, New Zealand and Israel. These countries are all innovation-driven economies or transitioning from efficiency-driven to innovation-driven economy. In these countries, a large share of entrepreneurship is likely innovative. The research will be done on the country level.

GEM gathers their data from multiple surveys, the Adult Population Survey (APS) and the National Expert Survey (NES). The APS is a survey conducted under at least 2000 adults in each country; the NES is a survey conducted under 35 to 40 experts, policymakers, academics and entrepreneurs, for each country. OECD has a large database with data and statistics, they work together with both policymakers and citizens. The World Bank gets its data from the statistical systems of the member countries.

By combining the data from these databanks, a new dataset is formed. First each variable will be explained per data source, then the exact setup for each hypothesis will be described. The variables are:

From Global Entrepreneurship Monitor:

- Adult Population Survey:
    - TEA
        - This is Total early-stage Entrepreneurial Activity, this variable is created by GEM and contains the percentage of the people from the age of 18 to 64 years that are nascent entrepreneurs or young business owners for each country. This means everybody from the age of 18 to 64 who have recently started a business or have owned a business for no more than 3.5 years.
    - Motivation
        - This variable is the Motivational Index as reported by GEM. This is the percentage of those who engage in TEA that is opportunity-driven entrepreneurs, divided by the percentage of necessity driven entrepreneurs.
    - Innovative Entrepreneurship

- This is measured by the innovation rate. This is the percentage of those involved in TEA who indicate that their product or service is innovative.
  - o High Status
    - This is the percentage of 18-64 population who think successful entrepreneurs receive a high status in their country.
  - o Entrepreneurship as a good career
    - This is the percentage of the population from 18 to 64 that agrees who state that in their country most people consider entrepreneurship as a good career choice.
  - o Perceived opportunities
    - This is the percentage of 18-64 population, who are not involved in any entrepreneurial activity, who think there are good business opportunities in their environment.
  - o Perceived Capabilities
    - This is the percentage of the population from the age of 18 to 64, who are not involved in any entrepreneurial activity, who think they have the skills and knowledge to start a business

- National Expert Survey:
  - o Government Support
    - This is the extent to which experts consider policies to be supportive entrepreneurship, measuring the relevance of entrepreneurship as an economic issue.
  - o Taxes and Bureaucracy
    - This is the extent to which experts consider taxes and regulations to be size-neutral or encourage entrepreneurship.
  - o Availability of Finance
    - This is the availability of financial resources, both equity and debt, for SMEs, as observed by experts.
  - o Internal Market Openness
    - This measures the extent to which firms are free to enter an existing market as observed by experts.
  - o Level of Change in Markets
    - This is the level of change in a market from year to year measured and assessed by experts.

- o Governmental Programs
  - ▪ This measures the presence and quality of governmental programs directly assisting SMEs, according to experts.
- o Basic School Education
  - ▪ This is the extent to which experts consider entrepreneurship to be incorporated at the primary and secondary school level.
- o Post School Education
  - ▪ This is the extent to which experts consider entrepreneurship to be incorporated at the primary and tertiary school level, such as vocational, college, university, business school, etc.
- o Commercial Infrastructures
  - ▪ This measures the presence of property rights, commercial, accounting and other legal and assessment services and institutions to support and promote SMEs according to experts.
- o Physical Infrastructure
  - ▪ This measure how accessible resources are at a price that is not discriminating against SMEs as observed to experts.
- o Cultural and Social Norms
  - ▪ This measures the extent to which experts consider entrepreneurship to be encouraged or allowed by social and cultural norms.
- o R&D Transfer
  - ▪ This is the extent to which national R&D leads to new commercial opportunities and is available to SMEs. So, this measures the extent to which R&D from national entities is transferred to SMEs, according to experts.

From the World Bank Database:
- - Number of Tertiary Education Graduates
  - o This is the number of people who graduated from tertiary education, both males and females are included in this number.

From the OECD Database
- - Average household income
  - o This is the gross adjusted disposable household income, aggregated at the country level.

- R&D Spending
  - This is the gross domestic spending on R&D as a percentage of GDP.
- Unemployment
  - This is the percentage of the working population that is unemployed, this means the percentage of the population from 18 to 64 years old who currently do not have a job but are available to work and are trying to find employment.
- Researchers
  - This is the number of professionals engaged in creating new knowledge, products or services per country.

From the World Economic Forum
- Innovation (World Economic Forum)
  - This is a measure for innovation created by the World Economic Forum for the Global Competitiveness Index. The 12th pillar of a competitive economy is Innovation. Innovation is determined by the quality of research institutions, R&D spending by companies, university-industry collaboration, government procurement of technology, intellectual property protection and the availability of scientists and engineers.

This dataset is put in Stata where multiple linear regressions were executed to test the hypotheses. The dataset contains data on 38 countries over 7 years. Due to some gaps in the data for some countries the dataset is unbalanced. The hypotheses are tested in 4 stages: the first stage assessed the relationship between crisis and entrepreneurship, the second stage assessed the relationship between crisis and innovation, the third stage assessed the relationship between crisis and innovative entrepreneurship and the fourth stage assessed the relationship between crisis and the ratio between necessity and opportunity-driven entrepreneurs. This way all four hypotheses are tested with linear regression with robust clustered standard errors at the country level. Because the dataset contains panel data, dummy variables for each year were included where 2006 is the base year. Furthermore, Variance Inflation Factors (VIF) are calculated to make sure there is no multicollinearity. VIF should be higher than 10 to ensure no multicollinearity, this is the case as the highest VIF is 5.88. The tables containing the Variance Inflation Factors can be found in Appendix B.

Linear regression is a statistical technique to model a relationship based on the data. The goal is to model the relationship $y_i = \beta_0 + \beta_1 x_{i1} + \cdots + \beta_n x_{in} + \varepsilon_i$. Where y_i is the dependent variable and

β_0 to β_n are the coefficients of independent variables x_{i1} to x_{1n} and ε represents the error term. Clustered Standard Errors occur when an individual trait, like cultural and social norms or physical infrastructures, is the same for groups of observations in a dataset. Clustered Standard Errors are more likely to be associated with panel data. When not controlled for these Clustered Standard Errors, the outcome of the regression will have smaller standard errors than usual, narrow confidence intervals, T-statistics that are too large and misleading p-values. By adding Clustered Standard Errors into the Stata command, the model will be controlled for Clustered Standard Errors. When performing regression, the output table contains a p-value. This is the probability of obtaining a result that is as extreme as the observed data, assuming the null hypothesis is true. The smaller the p-value, the stronger the evidence against the null hypothesis. Thus, the p-value indicates whether a result is statistically significant. Significance is usually measured at the 10%, 5% or 1% confidence level. Where 1% confidence level means that there is a 99% certainty that the confidence interval contains the true mean of the population. So, the lower the confidence level, the higher the certainty that the confidence interval contains the true mean of the population.

To measure recession and crisis, unemployment is used as a proxy, because unemployment gives a good reflection of the economic performance of a country. Recession is usually paired with high unemployment and high economic performance is usually paired with low unemployment. Unemployment is also used as a measure of economic performance by governments and statistical bureaus. Therefore, unemployment is a good proxy for this research.

For each hypothesis, a selection of control variables is made, based on their expected relevance for each dependent variable. First, it is established that there is no extremely high correlation between any of the variables, which means there is no correlation higher than 0.8. The tables containing these correlation analyses can be found in Appendix A. For the regression only variables were used that were expected to affect the dependent variable. These expectations were mainly based on the literature review, later the inclusion of each variables will be motivated. To test if these expectations led to good regression analysis, regressions were made with each possible control variable to double check if the chosen model is the best model. This confirmed that the chosen variables led to the highest statistical significance.

In the first hypothesis, the dependent variable is Total Entrepreneurial Activity. The independent variable is Unemployment, the control variables were:

- Perceived Opportunities, when more people think there are good business opportunities more people might be inclined to start a business.
- Availability of Finance, when finance is more easily available more people might be inclined to start a business.
- Government Support, when there are more policies supporting entrepreneurship, entrepreneurship might be more attractive.
- Market Openness, when market openness is higher, it is easier for new firms to enter the market. This can encourage entrepreneurship.
- Household Income, in countries with a higher average household income entrepreneurial activity, might be higher as the average household has more money available to start a business.
- Governmental Programs, when there are more programs by the government directly assisting SMEs and entrepreneurs, it might encourage more people to become entrepreneurs.
- Basic School Education, if people are more exposed to entrepreneurship during primary and secondary school, they might be more inclined to become an entrepreneur later in life.
- Post School Education, if people are more exposed to entrepreneurship at the tertiary school level, they might be more inclined to become an entrepreneur, this exposure happens by incorporating entrepreneurship in education.
- Physical Infrastructures, if resources are more easily available more people might be inclined to become an entrepreneur.
- Cultural and Social Norms, when entrepreneurship is encouraged or allowed by cultural and social norms, more people might be inclined to become an entrepreneur.

In the second hypothesis, the dependent variable is Motivation, this is the ratio between necessity and opportunity entrepreneurs. The independent variable is Unemployment. The control variables were:
- Availability of Finance, when finance is more easily available more people might be inclined to start a business.
- Government Support, when there are more policies supporting entrepreneurship, entrepreneurship might be more attractive.
- Level of Change in markets, when a market changes a lot from year to year, it might be more attractive to start a business and exploit opportunities. Changing markets usually have a lot of business opportunities.

- Household Income, in countries with a higher average household income entrepreneurial activity, might be higher as the average household has more money available to start a business.

- Governmental Programs, more programs assisting entrepreneurs, might help more people see and exploit business opportunities increasing the number of opportunity entrepreneurs.

- Post School Education, if people are more exposed to entrepreneurship at the tertiary school level, they might be more inclined to become an entrepreneur, this exposure happens by incorporating entrepreneurship in education.

- Physical Infrastructures, if resources are more easily available more people might be inclined to become an entrepreneur.

- R&D Transfer, when R&D transfer is high more people might be inclined to become an opportunity entrepreneur.

- Tertiary Education Graduates, opportunity entrepreneurship requires the skill to see and exploit business opportunities. Tertiary education graduates might be more likely to have this skill.

In the third hypothesis, the dependent variable is Innovation. The independent variable is Unemployment. The control variables were:

- R&D Transfer, when R&D transfer is high more people might be inclined to become an innovator and this can also be a sign of a high level of R&D and innovation in a country.

- Researchers, when a country has more individuals engaged in creating new knowledge, products or services, innovation is more likely to happen.

- R&D Spending, when a larger percentage of GDP is spent on R&D, more innovation is likely to happen.

- Tertiary Education Graduates, as innovation requires knowledge in certain fields, such as technology, IT and product design, tertiary education graduates are more likely to be innovative as they have knowledge in these fields.

In the fourth hypothesis, the dependent variable is Innovative Entrepreneurship. The independent variable is Unemployment. The control variables were:

- Perceived Opportunities, when more people think there are good business opportunities more people might be inclined to start an innovative business.

- Availability of Finance, when finance is more easily available more people might be inclined to start a business.

- Government Support, when there are more policies supporting entrepreneurship, entrepreneurship might be more attractive.

- Level of Change in markets, when a market changes a lot from year to year, it might be more attractive to start a business and exploit innovative opportunities. Changing markets usually have a lot of business opportunities, which can be attractive to people wanting to start an innovative business.

- Governmental Programs, governmental programs assisting entrepreneurship and SMEs might help people with an innovative idea to become actual innovative entrepreneurs.

- Basic School Education, if people are more exposed to innovative entrepreneurship during primary and secondary school, they might be more inclined to become an innovative entrepreneur later in life.

- Post School Education, if people are more exposed to entrepreneurship at the tertiary school level, they might be more inclined to become an entrepreneur, this exposure happens by incorporating entrepreneurship in education.

- Commercial Infrastructures, when there are more legal and assessment services to support and promote entrepreneurship, the threshold to become an entrepreneur might be lower.

- Physical Infrastructures, if resources are more easily available more people might be inclined to become an entrepreneur. However, during a crisis resources might not be that easily available making it harder for people to become an entrepreneur.

- Cultural and Social Norms, when entrepreneurship is encouraged or allowed by cultural and social norms, more people might be inclined to become an entrepreneur.

- High Status, when successful entrepreneurs have a high status in a country, it might encourage more people to become innovative entrepreneurs as innovative entrepreneurs are more likely to be successful.

- Researchers, when a country has more individuals engaged in creating new knowledge, products or services, innovation and innovative entrepreneurship. is more likely to happen.

Results

The data analysis tests all four hypotheses with linear regressions. All hypotheses, except the third hypothesis, are supported by the data. Below the results will be discussed for each hypothesis.

Recession and Entrepreneurship

The first stage tested the first hypothesis, with linear regression. This regression tested whether unemployment has a positive relation to entrepreneurship.

H1: Unemployment positively relates to entrepreneurship.

Table 1 shows the results of the linear regression of unemployment on TEA. The regression model has an R-squared of 53%, meaning that 53% of the variance of Entrepreneurship is explained by the independent variables in this model. The higher the R-Squared, the better the fit of the model. Unemployment has a small but positive and statistically significant effect on TEA. Meaning that when unemployment increases, we can see a small increase in the TEA. Government support has a significant negative relation to TEA. An increase in policies that support entrepreneurship and see entrepreneurship as a relevant economic issue will lead to a decrease in the TEA, this means that increased government support for entrepreneurship is actually related to a decreased level of entrepreneurship. It could be that government support is bound by requirements that actually make it less attractive to become an entrepreneur. The effect of household income is statistically significant and negative; however, this effect is so small that it is negligible. The biggest significant effects are those physical infrastructures and cultural and social norms. These are both positive. So, in countries where the cultural and social norms are more encouraging to entrepreneurship than other countries, TEA will be higher. Also, if resources are more easily available TEA will be higher. The year dummies for 2008, 2011 and 2012 also have a statistically significant relation to TEA. For 2008 the relation is positive, which can reflect a group of people who lost their job due to the recession that started in 2007 and had no other choice than to become an entrepreneur. For 2011 and 2012 there is also a statistically significant positive relation. This can be due to recovery of the economy in the first 4 years after the recession, when the economy starts to stabilize again, making it more attractive to start a business. The other independent variables added in this regression do not have a significant effect individually, but they did increase the R-squared of the regression model. All in all, these results indicate that the first hypothesis cannot be rejected, as the results provide support for this hypothesis. It can be said that unemployment has a positive relation to entrepreneurship.

TEA	Coefficient	Robust Std. Err.
Unemployment	0.094**	0.044
Perceived Opportunities	0.026	0.019
Availability of Finance	0.518	0.813
Government Support	-2.318**	0.662
Market Openness	0.708	0.842
Household Income	-0.000*	0.000
Governmental Programs	-0.493	0.638
Basic School Education	-0.850	0.848
Post School Education	0.320	0.849
Physical Infrastructures	1.155**	0.552
Cultural and Social Norms	3.656**	0.534
2007	-0.123	0.589
2008	1.158*	0.693
2009	0.201	0.624
2010	-0.126	0.646
2011	1.258*	0.698
2012	1.288*	0.662
Constant	-1.764	2.404
R-squared	0.539	
N	117	

Table 1: Linear regression of Unemployment on TEA. *p < 0.10, **p<0.05, ***p<0.01

Recession and Opportunity and Necessity Entrepreneurship

The second stage tested the second hypothesis with linear regression. This regression tested whether unemployment negatively relates to innovation.

H2: Unemployment negatively relates to the ratio between opportunity-driven and necessity-driven entrepreneurship.

The results of this linear regression can be found in Table 2. Motivation is the variable that measures the ratio between opportunity-driven and necessity-driven entrepreneurship. The regression model has an R-squared of 50%, this means that 50% of the variance of Motivation is explained by the independent variables in the model. Most independent variables do not have a significant effect on motivation. Unemployment does have a statistically significant effect on motivation, it is a small negative effect. This means that when unemployment increases, the number of opportunity-driven

entrepreneurs divided by the number of necessity-driven entrepreneurs decreases. Thus, when unemployment increases the share of necessity-driven entrepreneurs will increase relative to opportunity-driven entrepreneurs. Physical infrastructures and R&D transfer have a statistically significant, positive effect on motivation. This means that when resources become more easily accessible and R&D transfer is higher, the share of opportunity-driven entrepreneurship will increase relative to necessity-driven entrepreneurs. The other independent variables added in this regression do not have a significant effect individually, but they did increase the R-squared of the regression model.

These results show that the data supports the second hypothesis. Unemployment negatively relates to the ratio between opportunity-drive and necessity-driven entrepreneurs. This means that unemployment leads to a bigger increase in necessity-driven entrepreneurship than in opportunity-driven entrepreneurship.

Motivation	Coefficient	Robust Std. Err.
Unemployment	-0.124**	0.0587
Availability of Finance	0.342	1.028
Government Support	-1.565	1.224
Level of Change in Markets	0.847	0.984
Household Income	0.000	0.000
Governmental Programs	0.004	0.701
Post School Education	-0.164	0.997
Physical Infrastructures	2.309**	0.952
R&D Transfer	-1.424*	0.820
Tertiary Education Graduates	$2.73*10^{-8}$	$4.01*10^{-7}$
2011	-0.256	0.593
2012	-0.100	0.516
Constant	-1.314	4.821
R-squared	0.501	
N	39	

Table 2: Linear Regression of Unemployment on Motivation. *$p<0.10$, **$p<0.05$, ***$p<0.001$

Recession and Innovation

The third stage tested the third hypothesis with linear regression. The regression tested whether unemployment has a negative relation to innovation.

H3: Unemployment negatively relates to innovation.

The results of this regression can be found in Table 3. The regression model has an R-squared of 82%, meaning 82% of the variance of Innovation is explained by the independent variables. Unemployment has a small negative effect on innovation; however, the effect is not statistically significant. R&D Transfer and R&D spending have a positive and significant effect on innovation. This means that when national spending on R&D and national R&D leads to more commercial opportunities, innovation in that country increases. Also, the number of tertiary education graduates has a positive and statistically significant effect on innovation. So, as a country has more tertiary education graduates, innovation increases in that country. The other independent variables added in this regression do not have a significant effect individually, but they did increase the R-squared of the regression model.

Based on the results of the regression analysis, it is concluded that the data does not support the second hypothesis. The second hypothesis is rejected.

Innovation	Coefficient	Robust Std. Err.
Unemployment	-0.007	0.009
R&D Transfer	1.000***	0.193
Researchers	0.000	0.000
R&D Spending	0.625***	0.117
Tertiary Education Graduates	$1.79*10^{-7}$**	$7.44*10^{-8}$
2008	-0.035	0.125
2009	-0.060	0.151
2010	0.118	0.145
2011	0.161	0.160
2012	0.062	0.133
Constant	0.432	0.475
R-squared	0.827	
N	81	

Table 3: Linear Regression of Unemployment on Innovation. *$p<0.10$, **$p<0.05$, ***$p<0.001$

Recession and Innovative Entrepreneurship

The fourth stage of the data analysis tested the fourth hypothesis with linear regression. The regression tested whether unemployment has a negative relation to innovative entrepreneurship.

H4: Unemployment negatively relates to innovative entrepreneurship.

The results of this regression can be found in Table 4. The regression model has an R-squared of 66%, meaning that 66% of the variance of Innovative Entrepreneurship is explained by the

independent variables in the model. This model, like the other three models, does not have a lot of statistically significant effects. The effect of unemployment is statistically significant and negative. An increase in unemployment will lead to a decrease in innovative entrepreneurship. Perceived opportunities have a significant, negative effect on innovative entrepreneurship. When people think there are more good opportunities to start a business, innovative entrepreneurship will decrease. Governmental programs have a significant, positive effect on innovative entrepreneurship. This means that when more governmental programs are assisting SMEs, innovative entrepreneurship will increase. The other independent variables added in this regression do not have a significant effect individually, but they did increase the R-squared of the regression model.

These results show that the analysis supports the fourth hypothesis. Unemployment negatively relates to innovative entrepreneurship.

Innovative Entrepreneurship	Coefficient	Robust Std. Err.
Unemployment	-0.474**	0.205
Perceived Opportunities	-0.185**	0.082
Availability of Finance	3.556	5.010
Government Support	-1.043	3.179
Level of Change in Markets	1.288	3.411
Governmental Programs	4.693*	2.695
Basic School Education	-2.950	4.557
Post School Education	-7.314	4.586
Commercial Infrastructures	-0.514	5.866
Physical Infrastructures	6.921*	3.419
Cultural and Social Norms	0.691	2.655
High Status	-0.018	0.106
Researchers	0.001	0.001
2012	1.402	1.864
Constant	15.647	29.255
R-squared	0.660	
N	37	

Table 2: Linear regression of Unemployment on Innovative Entrepreneurship. *p<0.10, **p<0.05, ***p<0.001

Conclusion and Discussion

This thesis looked at the effects of a recession on innovative entrepreneurship and innovation in general. Although several previous studies have investigated the effects of a recession on entrepreneurship, there is no clear view yet of what the effect of a recession is on innovative entrepreneurship. The literature on entrepreneurship during a recession presents ambiguity, showing evidence for two opposing hypotheses. The literature on the effect of a recession on innovation concludes that the effects of recession on entrepreneurship are mainly determined by national characteristics, such as policy and cultural and social norms. This thesis attempts to form a clear conclusion regarding innovative entrepreneurship and innovation during a recession. This is done by performing linear regressions to test four different hypotheses.

First, the relation between a recession and entrepreneurship in general was analyzed. This shows that there is a positive relation of a recession with entrepreneurship. This suggests that a recession will lead to an increase in entrepreneurship in a country. Second, the relation between recession and the ratio between opportunity-driven and necessity-driven entrepreneurship was assessed. This analysis demonstrates that a recession leads to an increase in necessity-driven entrepreneurship relative to opportunity-driven entrepreneurship. So, while a recession leads to an increase in entrepreneurship, most of these new entrepreneurs will be necessity driven and not opportunity driven. Third, this thesis examined the relation between a recession and innovation. However, the regression analysis does not show a statistically significant effect of a recession on innovation. This means that a recession does not have an impact on the amount of innovation in a country, but it could have an effect on the structure and type of innovation. Fourth, and finally, the relation between recession and innovative entrepreneurship was evaluated. The results indicate that there is a negative relation between a recession and innovative entrepreneurship. This indicates that a recession will lead to a decrease in innovative entrepreneurship.

At the beginning of this thesis, a research question was formulated, along with some topics to be discussed and researched. These topics were stated to help come to an answer to the research question.

- *The relation between recession and innovation and innovative entrepreneurship.*
  - Unemployment negatively relates to innovative entrepreneurship and the number of researchers in R&D does not have a statistically significant relation to innovative entrepreneurship.
- *The relation between recession and total entrepreneurial activity.*

- o   Recession positively relates to total entrepreneurial activity.
- *The relation between recession and opportunity and necessity entrepreneurship.*
  - o   Recession negatively relates to the ratio of opportunity to necessity entrepreneurship.
- *The relation between recession and innovation.*
  - o   There is no effect of a recession on innovation.

With these answers and the results of the research done in this thesis, an answer can be formulated to the main research question.

What is the effect of an economic recession on innovative entrepreneurship?

It can be concluded that an economic recession negatively relates to innovative entrepreneurship. Although a recession has a positive relation with entrepreneurship, the relation with innovative entrepreneurship, in particular, is negative. This could mean that the increased amount of entrepreneurs are entrepreneurs who start out of necessity and have no intention to innovate. This was also stated by Koellinger & Thurik (2012). This is also one of the hypotheses that comes forth out of previous literature. One stream of literature, on the effect of a recession on entrepreneurship states that, as unemployment increases, people are pushed towards entrepreneurship, which is the recession-push hypothesis (Parker, 2004). These people pushed into entrepreneurship are most likely to engage in marginal entrepreneurship since their main motivation is the necessity to make money.

Another implication of the results of this research is that a recession leads to fewer resources available and a less stable economic environment, as a common crisis strategy is to cut down costs and therefore cut back on innovation (Milic, 2013). A crisis can discourage people to start an innovative business and discourage young business owners to innovate. If important resources such as finance and knowledge are less easily available, fewer people might be inclined to innovate. This is in line with the hypothesis that innovation is cyclical, as stated by Filipetti & Archiburg (2011). During a recession, perceived business opportunities can be fewer as the economic environment is less encouraging to entrepreneurship. Innovative entrepreneurship is mostly opportunity-driven, meaning people deliberately decide to start a business, often quitting their job to do so (Koellinger & Thurik, 2012). During a recession, people might be less willing to leave the comfort of a paid job with all its benefits to start a business with no certainty on their future income.

Even though the research question and the sub-questions were answered, this research can be improved. With more time and money more data can be obtained or data on other aspects influencing innovative entrepreneurship, such as the presence of innovative start-up hubs in a country or the extent to which a country's culture is conductive to innovative ideas. This can help establish if there are other variables connected to recession that have an impact on innovative entrepreneurship. One criticism of this research can be that it might take some time for the effects of a recession to set in. This could mean that it might take 5 or 10 years before the actual effects of a recession become visible. To test this a regression using time lags for unemployment could be performed. Also, it could have been useful to consider alternative proxies for a recession, such as government spending or GDP. Using a different proxy for recession can give different results than the one shown in this research. This is particularly true for innovation. It is very well possible that a different proxy for recession shows a statistically significant effect of a recession on innovation. Another issue that should not be overlooked is Omitted Variable Bias. This can cause over- or underestimation of relationships between variables. However, there are so many factors that might have an effect on entrepreneurship and recession, that it is almost impossible to eliminate Omitted Variable Bias completely.

Future research could focus more on how government support and policies can prevent the unfavorable effects of a recession on innovative entrepreneurship. This can be done by looking at the effect that certain policies and support measures have on innovative entrepreneurship. In the future research could also differentiate between industries, to see if certain industries suffer greater effects of recession than others.

Thus, this research showed that a recession negatively relates to innovative entrepreneurship. However, this research is not sufficient to make a definitive concluding statement on the effect of a recession on innovative entrepreneurship. To substantiate the results in this thesis, further research is needed.

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Appendix A – Correlation

Table 3: First stage correlation

	TEA	Unemployment	Perceived Opportunities	Perceived Capabilities	Available Finance	Government Support	Taxes and Bureaucracy
TEA	1						
Unemployment	0.2138	1					
Perceived Opportunities	0.1652	-0.2843	1				
Perceived Capabilities	0.4734	0.4309	0.0837	1			
Availability of Finance	-0.0403	-0.4268	0.2656	-0.1288	1		
Government Support	-0.1127	-0.3960	0.3205	-0.1980	0.5790	1	
Taxes and Bureaucracy	0.1906	-0.3242	0.5190	-0.1252	0.4080	0.7236	1
Market Openness	0.1575	-0.4445	0.2527	-0.1684	0.5775	0.6026	0.6405
Level of Change in Markets	0.1996	0.2105	0.0110	0.2531	-0.3589	-0.3441	-0.2487
Household Income	-0.0502	-0.3729	0.3108	0.0480	0.3925	0.3661	0.3205
Governmental Programs	0.0761	-0.4023	0.3090	-0.1055	0.5920	0.7850	0.6812
Basic School Education	0.1414	-0.2246	0.4423	-0.2168	0.3669	0.2884	0.4153
Post School Education	0.1582	-0.2442	0.0486	-0.0344	0.3581	0.2990	0.3611
Commercial Infrastructures	0.0846	-0.3694	0.2638	-0.2439	0.6667	0.5454	0.6232
Physical Infrastructures	0.1909	-0.3666	0.3947	-0.1662	0.4954	0.5187	0.6560
Cultural and Social Norms	0.3078	-0.3230	0.2540	-0.0500	0.3966	0.3512	0.4901
High Status	0.0108	-0.1693	0.3148	-0.0433	0.0846	0.2812	0.3045
Entrepreneurship as a good career	0.2102	0.3904	0.0151	0.3340	-0.3052	-0.4213	-0.3371
Tertiary Education Graduates	-0.0111	-0.0099	0.0067	0.0294	0.0767	-0.0400	-0.0896

	Market Openness	Level of Change in Markets	Household Income	Governmental Programs	Basic School Education	Post School Education	Commercial Infrastructures
Market Openness	1						
Level of Change in Markets	-0.4078	1					
Household Income	0.2308	-0.0946	1				
Governmental Programs	0.5896	-0.4120	0.4531	1			
Basic School Education	0.4310	-0.1922	0.0735	0.2461	1		

Post School Education	0.3230	-0.0642	0.1748	0.3252	0.3649	1	
Commercial Infrastructures	0.7315	-0.5369	0.2545	0.5486	0.5649	0.4684	1
Physical Infrastructures	0.5835	0.3154	0.2020	0.5703	0.3537	0.3152	0.6232
Cultural and Social Norms	0.4997	-0.1623	0.5245	0.3241	0.3698	0.4806	0.5448
High Status	0.2002	-0.2485	0.1489	0.2466	0.0875	-0.1098	0.2046
Entrepreneurship as a good career	-0.3589	0.3156	-0.0154	-0.3517	-0.1126	-0.1259	-0.3759
Tertiary Education Graduates	-0.0134	-0.0661	0.0241	0.0189	0.0762	0.0123	-0.0273

	Physical Infrastructures	Cultural and Social Norms	High Status	Entrepreneurship as a good career	Tertiary Education Graduates
Physical Infrastructures	1				
Cultural and Social Norms	0.3638	1			
High Status	0.1639	0.1071	1		
Entrepreneurship as a good career	-0.4346	-0.1905	-0.1769	1	
Tertiary Education Graduates	0.0915	-0.0462	0.1065	-0.1464	1

Table 4: Second stage correlation

	Innovation	Unemployment	Perceived Opportunities	Perceived Capabilities	Available Finance	Government Support	Taxes and Bureaucracy
Innovation	1						
Unemployment	-0.5421	1					
Perceived Opportunities	0.4587	-0.2720	1				
Perceived Capabilities	-0.2417	0.4150	0.0845	1			
Available Finance	0.6414	-0.4413	0.2683	-0.1345	1		
Government Support	0.6599	-0.3850	0.3222	-0.2021	0.5790	1	
Taxes and Bureaucracy	0.5990	-0.3189	0.5215	-0.1293	0.4080	0.7236	1
Market Openness	0.6129	-0.4523	0.2528	-0.1688	0.5775	0.6026	0.6405
Level of Change in Markets	-0.3876	0.2417	0.0106	0.2547	-0.3589	-0.3441	-0.2487
Household Income	0.6902	-0.3206	0.3108	0.0480	0.3925	0.3661	0.3205

	Market Openness	Level of Change in Markets	Household Income	Governmental Programs	Basic School Education	Post School Education	Commercial Infrastructures
Governmental Programs	0.6966	-0.4142	0.3120	-0.113	0.5920	0.7850	0.6812
Basic School Education	0.3146	-0.2439	0.4425	-0.2177	0.3669	0.2884	0.4153
Post School Education	0.3170	-0.2805	0.0500	-0.0383	0.3581	0.2990	0.3611
Commercial Infrastructures	0.6141	-0.3613	0.2668	-0.2508	0.6667	0.5454	0.6232
Physical Infrastructures	0.6934	-0.3509	0.3992	-0.1737	0.4954	0.5187	0.6560
Cultural and Social Norms	0.5601	-0.3298	0.2562	-0.0547	0.3966	0.3512	0.4901
High Status	0.4119	-0.1643	0.3143	-0.0416	0.0890	0.2848	0.3085
Entrepreneurship as a good career	-0.4019	0.4145	0.0137	0.3387	-0.2995	-0.4180	-0.3331
R&D Transfer	0.7614	-0.5004	0.2706	-0.1671	0.7106	0.6931	0.6883
Researchers	0.7919	-0.5159	0.5218	-0.2469	0.3532	0.5293	0.5873
R&D Spending	0.8694	-0.2752	0.4573	-0.0539	0.4705	0.4699	0.4325
Tertiary Education Graduates	0.1355	-0.1234	-0.1578	-0.1488	-0.1293	0.0283	-0.1467

	Market Openness	Level of Change in Markets	Household Income	Governmental Programs	Basic School Education	Post School Education	Commercial Infrastructures
Market Openness	1						
Level of Change in Markets	-0.4078	1					
Household Income	0.2308	-0.0946	1				
Governmental Programs	0.5896	-0.4120	0.4531	1			
Basic School Education	0.4310	-0.1922	0.0735	0.2461	1		
Post School Education	0.3230	-0.0642	0.1749	0.3252	0.3649	1	
Commercial Infrastructures	0.7315	-0.5369	0.2545	0.5486	0.5649	0.4684	1
Physical Infrastructures	0.5835	-0.3154	0.2020	0.5703	0.3537	0.3152	0.6232
Cultural and Social Norms	0.4997	-0.1623	0.5245	0.3241	0.3698	0.4806	0.5448
High Status	0.2004	-0.2498	0.1489	0.2519	0.0880	-0.1070	0.2102
Entrepreneurship as a good career	-0.3601	0.3149	-0.0154	-0.3464	-0.1122	-0.1203	-0.3704
R&D Transfer	0.6705	-0.4708	0.4275	0.7930	0.3678	0.5561	0.7261
Researchers	0.3978	-0.3580	0.5402	0.4861	0.3278	0.0614	0.4112
R&D Spending	0.2926	-0.1772	0.5785	0.5014	0.1835	0.2062	0.3931

	-0.0789	0.0683	0.3396	-0.1768	-0.0492	-0.0111	-0.1109	
Tertiary Education Graduates								
	Physical Infrastructures	Cultural and Social Norms	High Status	Entrepreneurship as a good career	R&D Transfer	Researchers	R&D Spending	Tertiary Education Graduates
Physical Infra Structures	1							
Cultural and Social Norms	0.3638	1						
High Status	0.1700	0.1113	1					
Entrepreneurship as a good career	-0.4293	-0.1844	-0.1807	1				
R&D Transfer	0.6609	0.5390	0.2246	-0.4375	1			
Researchers	0.6489	0.3613	0.4237	-0.4988	0.5450	1		
R&D Spending	0.5746	0.4501	0.2964	-0.3548	0.5731	0.8248	1	
Tertiary Education Graduates	-0.2322	0.2385	-0.0798	-0.0299	-0.1684	0.0011	0.0079	1

Table 5: Third stage correlation

	Motivation	Unemployment	Perceived Opportunities	Perceived Capabilities	Available Finance	Government Support	Taxes and Bureaucracy
Motivation	1						
Unemployment	-0.4769	1					
Perceived Opportunities	0.6709	-0.2840	1				
Perceived Capabilities	-0.2651	0.4304	0.0837	1			
Available Finance	0.2806	-0.4444	0.2656	-0.1288	1		
Government Support	0.1632	-0.3912	0.3205	-0.1980	0.5790	1	
Taxes and Bureaucracy	0.3613	-0.3189	0.5190	-0.1252	0.4080	0.7236	1
Market Openness	0.2117	-0.4404	0.2527	-0.1684	0.5775	0.6026	0.6405
Level of Change in Markets	-0.0915	0.2275	0.0110	0.2531	-0.3589	-0.3441	-0.2487
Household Income	0.3439	-0.3711	0.3108	0.0480	0.3925	0.3661	0.3205
Governmental Programs	0.3600	-0.4116	0.3090	-0.1055	0.5920	0.7850	0.6812
Basic School Education	0.4157	-0.2443	0.4423	-0.2168	0.3669	0.2884	0.4153
Post School Education	0.1662	-0.2757	0.0486	-0.0344	0.3581	0.2990	0.3611

Commercial Infrastructures	0.2554	-0.3594	0.2638	-0.2439	0.6667	0.5454	0.6232
Physical Infrastructures	0.5677	-0.3499	0.3947	-0.1662	0.4954	0.5187	0.6560
Cultural and Social Norms	0.2126	-0.3252	0.2540	-0.0500	0.3966	0.3512	0.4901
High Status	0.1319	-0.1685	0.3148	-0.0433	0.0846	0.2812	0.3045
Entrepreneurship as a good career	-0.1524	0.4061	0.0151	0.3340	-0.3052	-0.4213	-0.3371
R&D Transfer	-0.1970	-0.1181	0.0204	0.0679	0.2614	0.3107	0.1844
Tertiary Education Graduates	-0.0293	-0.0330	-0.0547	0.0670	0.1981	0.0928	0.0066

	Market Openness	Level of Change in Markets	Household Income	Governmental Programs	Basic School Education	Post School Education	Commercial Infrastructures
Market Openness	1						
Level of Change in Markets	-0.4078	1					
Household Income	0.2308	-0.0946	1				
Governmental Programs	0.5896	-0.4120	0.4531	1			
Basic School Education	0.4310	-0.1922	0.0735	0.2461	1		
Post School Education	0.3230	-0.0642	0.1749	0.3252	0.3649	1	
Commercial Infra Structures	0.7315	-0.5369	0.2545	0.5486	0.5649	0.4684	1
Physical Infrastructures	0.5835	-0.3154	0.2020	0.5703	0.3537	0.3152	0.6232
Cultural and Social Norms	0.4997	-0.1623	0.5245	0.3241	0.3698	0.4806	0.5448
High Status	0.2002	-0.2485	0.1489	0.2466	0.0875	-0.1098	0.2046
Entrepreneurship as a good career	-0.3589	0.3156	-0.0154	-0.3517	-0.1126	-0.1259	-03759
R&D Transfer	0.3798	-0.1543	0.2644	0.1392	0.0151	0.0093	0.1979
Tertiary Education Graduates	0.0486	-0.0625	0.0924	0.0523	0.1115	-.1029	0.1018

	Physical Infrastructures	Cultural and Social Norms	High Status	Entrepreneurship as a good career	R&D Transfer	Tertiary Education Graduates

Physical Infrastructures	1					
Cultural and Social Norms	0.3638	1				
High Status	0.1639	0.1071	1			
Entrepreneurship as a good career	-0.4346	-0.1905	-0.1768	1		
R&D Transfer	0.0333	0.2745	0.1956	-0.1259	1	
Tertiary Education Graduates	0.1717	0.0890	0.0029	-0.1391	0.1415	1

Table 6: Fourth stage correlation

	Innovative Entrepreneurship	Unemployment	Perceived Opportunities	Perceived Capabilities	Available Finance	Government Support	Taxes and Bureaucracy
Innovative Entrepreneurship	1						
Unemployment	-0.4149	1					
Perceived Opportunities	0.1805	-0.2838	1				
Perceived Capabilities	-0.0203	0.4301	0.0840	1			
Available Finance	0.3219	-0.4444	0.2656	-0.1288	1		
Government Support	0.4352	-0.3912	0.3205	-0.1980	0.5790	1	
Taxes and Bureaucracy	0.3846	-0.3189	0.5190	-0.1252	0.4080	0.7236	1
Market Openness	0.5577	-0.4404	0.2527	-0.1684	0.5775	0.6026	0.6405
Level of Change in Markets	-0.1356	0.2275	0.0110	0.2531	-0.3589	-0.3441	-0.2487
Household Income	0.2659	-0.3711	0.3108	0.0480	0.3925	0.3661	0.3205
Governmental Programs	0.4667	-0.4116	0.3090	-0.1055	0.5920	0.7850	0.6812
Basic School Education	-0.0120	-0.2443	0.4423	-0.2168	0.3669	0.2884	0.4153
Post School Education	0.2719	-0.2757	0.0486	-0.0344	0.3581	0.2990	0.3611
Commercial Infrastructures	0.3069	-0.3594	0.2638	-0.2439	0.6667	0.5454	0.6232
Physical Infrastructures	0.3731	-0.3499	0.3947	-0.1662	0.4954	0.5187	0.6560
Cultural and Social Norms	0.3218	-0.3252	0.2540	-0.0500	0.3966	0.3512	0.4901
High Status	0.1843	-0.1683	0.3147	-0.0432	0.0846	0.2812	0.3045

Entrepreneurship as a good career	-0.2905	0.4083	0.0143	0.3355	-0.3052	-0.4213	-0.3371
R&D Transfer	0.3140	-0.1181	0.0210	0.0675	0.2614	0.3107	0.1844
Researchers	0.4212	-0.0136	-0.0562	0.0783	0.1706	0.2910	0.1162
Tertiary Education Graduates	-0.0670	-0.0330	-0.0543	0.0664	0.1981	0.0928	0.0066

	Market Openness	Level of Change in Markets	Household Income	Governmental Programs	Basic School Education	Post School Education	Commercial Infrastructures
Market Openness	1						
Level of Change in Markets	-0.4078	1					
Household Income	0.2308	-0.0946	1				
Governmental Programs	0.5896	-0.4120	0.4531	1			
Basic School Education	0.4310	-0.1922	0.0735	0.2461	1		
Post School Education	0.3230	-0.0642	0.1749	0.3252	0.3649	1	
Commercial Infrastructures	0.7315	-0.5369	0.2545	0.5486	0.5649	0.4684	1
Physical Infrastructures	0.5835	-0.3154	0.2020	0.5703	0.3537	0.3152	0.6232
Cultural and Social Norms	0.4997	-0.1623	0.5245	0.3241	0.3698	0.4806	0.5448
High Status	0.2002	-0.2485	0.1489	0.2466	0.0875	-0.1098	0.2046
Entrepreneurship as a good career	-0.3589	0.3156	-0.0154	-0.3517	-0.1126	-0.1259	-0.3759
R&D Transfer	0.3798	-0.1543	0.2644	0.1392	0.0151	0.0093	0.1979
Researchers	0.1140	0.0010	0.2425	0.3339	-0.1585	0.1106	0.0268
Tertiary Education Graduates	0.0486	-0.0625	0.0924	0.0523	0.1115	0.1029	0.1018

	Physical Infrastructures	Cultural and Social Norms	High Status	Entrepreneurship as a good career	R&D Transfer	Researchers	Tertiary Education Graduates
Physical Infrastructures	1						
Cultural and Social Norms	0.3638	1					
High Status	0.1639	0.1071	1				
Entrepreneurship as a good career	-0.4346	-0.1905	-0.1775	1			
R&D Transfer	0.0333	0.2745	0.1962	-0.1244	1		
Researchers	0.0231	0.1837	0.0651	0.0229	0.5450	1	
Tertiary Education Graduates	0.1717	0.0890	0.0031	-0.1377	0.1415	-0.0548	1

Appendix B – Variance Inflation Factor

Table 7: First stage Variance Inflation Factor

TEA	VIF	1/VIF
Unemployment	1.78	0.562
Perceived Opportunities	2.36	0.423
Availability of Finance	3.85	0.260
Government Support	3.17	0.316
Market Openness	2.53	0.395
Household Income	2.40	0.417
Governmental Programs	3.18	0.315
Basic School Education	2.54	0.393
Post School Education	1.85	0.541
Physical Infrastructures	2.37	0.422
Cultural and Social Norms	2.34	0.427
2007	1.74	0.573
2008	1.69	0.590
2009	2.01	0.497
2010	2.29	0.436
2011	2.41	0.414
2012	2.59	0.386
Mean VIF	2.42	

Table 8: Second stage Variance Inflation Factors

Innovation	VIF	1/VIF
Unemployment	1.67	0.600
R&D Transfer	2.09	0.479
Researchers	4.25	0.235
R&D Spending	3.92	0.254
Tertiary Education Graduates	1.18	0.845
2008	1.36	0.736
2009	1.77	0.566
2010	1.86	0.538
2011	2.22	0.451
2012	2.30	0.434
Mean VIF	2.26	

Table 9: Third stage Variance Inflation Factors

Motivation	VIF	1/VIF
Unemployment	2.17	0.461
Availability of Finance	3.52	0.284
Government Support	4.61	0.217
Level of Change in Markets	2.12	0.473
Household Income	2.06	0.484
Governmental Programs	3.51	0.285
Post School Education	2.77	0.360

Physical Infrastructures	2.23	0.449
R&D Transfer	1.43	0.697
Tertiary Education Graduates	1.25	0.801
2011	1.53	0.656
2012	1.63	0.612
Mean VIF	2.40	

Table 10: Fourth stage Variance Inflation Factors

Innovative Entrepreneurship	*VIF*	*1/VIF*
Unemployment	2.14	0.467
Perceived Opportunities	3.89	0.257
Availability of Finance	4.36	0.229
Government Support	3.10	0.323
Level of Change in Markets	2.69	0.372
Governmental Programs	3.84	0.261
Basic School Education	3.93	0.254
Post School Education	4.12	0.243
Commercial Infrastructures	5.88	0.170
Physical Infrastructures	3.77	0.265
Cultural and Social Norms	3.23	0.309
High Status	1.56	0.641
Researchers	2.76	0.362
2012	1.29	0.773
Mean VIF	3.33	