Bachelor Thesis:

A New Glance into the Relationship between Regional Growth and Entrepreneurship

The Case of the Netherlands from 1990-2000

Bachelor in Economics and Business Economics

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Introduction:

In the years following the Second World War, Western Europe experienced unprecedented growth; this period is commonly known as the Golden Age of Capitalism (Schor & Marglin, 1990). The average standards of living (as compared to the 1920's) got multiplied by 4.5 for (West) Germany, 3.5 for France and roughly 3 for Great Britain (Long, 1997). The main underlying economic doctrine at the time was the Keynesian theory; which advocated strong political intervention in economic affairs to incite growth (Long, 1997). The Netherlands was no different, with a yearly growth of the standard of living of 3.9% (Aarts, 1999).

Along with the growth in the economy, the urban face of Western Europe brightened. Many cities in the Netherlands were badly hurt or even completely in ruins at the aftermath of the Second World War. However nowadays, 50 years later, the Port of Rotterdam has a world-wide recognition. Furthermore "the Randstad", a geographical agglomeration which includes Rotterdam, The Hague, Amsterdam and Utrecht became known as one of the biggest Megalopolis of Western Europe. Even though this area only accounts for about 20% of the total surface of the Netherlands; more than half of the Dutch population is employed and lives in the Randstad (Nijmeijer, 2000).

Which events lead to such a surge in growth? How did the areas that were the most badly hurt by the war become so prosperous? Is it due to the support of the US in the reconstruction or the rise in entrepreneurial activity? Or did shocks of growth simply fall out of the sky?

In a report published in 2012, Cecil Bohanon investigates the economic transition that took place in the US. Much of the growth after the war was acredited to Keynesian expansion policies with high government expenditure; however Bohanon concluded that the US government expenditure actually decreased drastically after the conflicts. In 1944 US government expenditure accounted for 55% of the US GDP, this amount fell to 16% by 1947. Many economists at the time expected a huge drop in the US economy and feared a new depression. Furthermore between mid-1945 to mid-1947 20Million people got released from the armed forces. Keeping in mind that this decrease in expenditure and increase in unemployment were simultaneous a dramatic scenario was feasible. However, Bohanon explains the unprecedented growth of the

US economy as a feature of the deregulation of the market. He describes the war economy as a command economy, aimed only to provide support for the conflict. At the end of this conflict, government expenditure declined while the economy gradually got freed from price-regulations and so resources got re-allocated in an efficient manner. The increases in private welfare compensated for the decrease in the public sector and due to the free price-mechanisms the market regulated itself (Bohanon, 2012).

Barry Eichengreen, another American economist, published a review entitled “The European Economy since 1945” and studied the European economy at the same time period as Bochanon (Eichengreen, 2007). In his analysis he shows that Europe experienced rapid growth by exploiting the backlog of new technologies that were not commercialized due to the world conflict. Moreover he states that Europe, by imitating the capitalist model of the US, “closed the gap” and quickly caught up with US production levels. Evidence of the European Recovery Plan (aka. Marshall Plan) being a great help to this development was also found, Eichengreen defined the Western European Economy at the time as “coordinated capitalism” (instead of being really free market) (Foundation, 2017; Eichengreen, 2007).

This last finding is in line with the convergence theory by Solow & Swann (1956) which states that economies of less developed countries will converge towards the levels of more developed ones if they have identical saving rates for human and physical capital. Furthermore, their respective “neo-classical” growth models describe economic growth as; an exogenous, non-continuous process characterized by shocks. These shocks are issued from capital accumulation, labor and population growth as well as increases in productivity due to technological progress. This is in line with Schumpeter who defined the creative destruction process as a fruit of capital accumulation (Solow R. M., 1956; Swan, 1956; Schumpeter, 1942).

This explains the rapid recovery of Western Europe as a whole until the 70’s. From then on, the OPEC countries provoked two oil crisis in 1973 and 1979 which hampered GDP and welfare growth and caused a slowdown in growth (Long, 1997). Further support to explain the slowdown of the economy is found in the transition of the type of economy. The catch-up opportunities left by the gap in development between Western Europe and the US got exhausted. Therefore the economy went from

“extensive growth” towards “intensive growth” This mean that the economy doesn’t rely on capital formation and increases in productivity anymore but relies on pure “innovation” (Eichengreen, 2007).

Empirical Evidence:

In order to verify the statements in the previous section data concerning the productivity per capita was retrieved on the “Centraal Bureau van de Statistiek’s” website. This information is deemed reliable as it is published by an independent governmental institution. The retrieved statistics are summarized in Table1. From the table, clear evidence of the increases in productivity ever since the reconstruction of the Netherlands at the aftermath of World War 2 can be found (CBS, 2017).

Years	GDP, per head of population (1000 PPS)	Growth Rates of GDP per capita	GDP, per hour worked (in US$, 2005 PPP)
1960	1.2	167.7%	-
1970	2.6	203.8%	-
1980	7.9	100%	-
1990	15.8	62%	37.3
2000	25.6	25.4%	46.2
2010	32.1	-	52.2

Table 1: Labor Productivity (adjusted to PPS)

Ever since the 60’s the GDP per capita has been increasing; furthermore the contribution per hour worked is also rising. The GDP per head of population went from 1.2 (1000PPS) to 32.1 with the strongest growth in the 1960’s and 1970’s. The growth rate of the GDP per capita was of 167.7% from 1960-1970 and of 203.8% from 1970-1980. This supports the statement from Eichengreen (2007), who attributed strong increases in productivity to the extensive growth in Western Europe because of the technology gap. When these opportunities got exhausted a slowdown in growth was experienced between 1990&2000 as well as 2000-2010 with growth rates of GDP/ Capita of only 62% and 25.4% respectively. This does mean that growth was still experienced. However when these rates are compared to the ones of the 60’s one can state that a slowdown in the growth is experienced.

As was established above; through the writings of Eichengreen (2007), the Netherlands underwent fast growth from 1945 until the end of the century where a shift in the type of growth was experienced. The Dutch economy shifted from extensive growth towards an intensive growth model. However, was this the case for the country as a whole? No information on the mapping of this growth has yet been provided and therefore the following paragraph will aim to map regional economic inequalities in growth in the Netherlands.

In order to properly grasp the following analysis it is paramount to know the COROP[1] regional geography concept. In 1970, a team of Dutch government researchers created a layout of the Dutch mainland in which they separated the country into 40 distinct precincts. This layout was based upon work and general mobility flows and the purpose was to combine municipalities with common features. This would enable to make more accurate regional research. For the following analysis, data on each COROP was retrieved on CBS[2] (CBS, 2017). All the 40 regions are mapped in the Appendix and can be found in chart 2.

The database that was retrieved on CBS held information on each precinct concerning the growth rate of the added value, growth in productivity per worker, growth in capital per worker, growth in investment as well as turbulence[3]. The growth rates were found by personal computation. Therefore as the initial data ran from 1990-2001 after computation of the growth rates; the final values only concerns the years from 1990 until 2000 (CBS, 2017).

Based on the growth rates for each precinct we observed that not all COROP's grew at the same rate. In order to determine which regions experienced the most pro-eminent growth over the time span we started by correcting each growth rate for inflation at the time. Then we filtered out each region which did not have a growth above 2% (this was done for each year from 1990 until 2000). Finally we combined the remaining COROP's in one file and checked how many time each region appears over the 10 years. The results of this analysis were summarized in a table that can be found in the Appendix, Table3. The highlighted COROP in the table

[1] Regional area in the Netherlands used for analytical purpose. Literal translation stands as Coordination Commission Regional Research Program

[2] Centraal Bureau voor de Statistiek, Dutch national centre for Statistics

[3] Sum of entries and exits of firms in a market

concern each precinct which geographically belongs to “the Randstad”. From the analysis we were able to determine that, on the 40 precincts 12 concern the Randstad and 4 of them are in the top 10. Those areas are “Oost-Zuid-Holland”, “Utrecht”, “Delft en Westland” and “Groot-Amsterdam”

Complementary specifications concerning the geographical region also known as “the Randstad” have to be provided. As stated in the introduction, it is also known as the Dutch Megalopolis and concerns 12 COROPS (in bold in the appendix). In order to support the claim that this region is very attractive statistical evidence was retrieved. In a report published by the CBS, the growth prognostics for the main cities over the next 15 years were respectively; 18.1% for Amsterdam, 21.4% for Utrecht, 13% for The Hague and 10.1% for Rotterdam. This increase of population in the Randstad goes at the cost of the more rural areas of the Netherlands who are more and more left behind on socio-economic terms. Kooiman et al. (2013) explains that these discrepancies between regions are due to the characteristics of the migrating population within the country. The researchers explain that the population which leaves the rural (mostly Eastern) provinces of the Netherlands is on average younger, has a higher knowledge capital, has had better schooling and earns on average higher wages. Therefore there is an accumulation of human capital in the already favored regions of the Netherlands (de Randstad) which leads to stronger and stronger inequalities in the country due to this vicious circle (PBL/CBS, 2016; Kooiman, Latten, & Annema, 2013).

The final relevant evidence that has to be considered before the actual analysis concerns entrepreneurship in the Netherlands. Data about entrepreneurship was retrieved on the GEM Monitor (Global Entrepreneurship Monitor, 2017) and from it we sketched the amount of new businesses and SME’s[4] over time. The chart can be retrieved in the Appendix, Table 4. From it, we can see that the total number of businesses in the Netherlands from 1987 until 2001 has increased by at least 300’000. However, at the beginning of the 1980’s a decrease in number of businesses was experienced. This cannot be determined in the total trend but from Table 5. This decrease which was due to the 2 consecutive OPEC crisis was only reverted in the mid 1980’s. Nowadays the Netherlands economy performs well and has a strong

[4] SME’s is an abbreviation for Small and Medium sized Entreprises

entrepreneurial activity. It is also 3rd out of 65 countries with Entrepreneurial Employee Activity Rate of 7.6 (Global Entrepreneurship Monitor, 2017).

To conclude, from the previous sections we have observed that; the Netherlands experienced strong increases in labor productivity with extensive growth until the end of the 70's. Furthermore regional inequalities exist in the Netherlands and keep growing due to the high attractivity of the urban areas for young and capital full individuals. Additionally certain COROP regions not related to the Randstad have experienced strong growth. Finally the Netherlands underwent a transition towards innovation based growth with strong entrepreneurial activity. This leads us to the following research question;

Rq: Can entrepreneurial activity explain differences in growth rates in different COROP regions?

But why is this relevant? What is the motivation behind this research? The answer lies in the possible generalizations that we can drawn from the conclusion of this analysis. Suppose our results are externally valid and we determine that entrepreneurship drives regional growth and renders certain geographical regions prosperous. If that is the case then we can suggest economic policies and subventions to entrepreneurship in unfavored regions in order to hamper the growth in inequalities. Furthermore, given that the world currently suffers from many conflicts with very destructive effects reconstruction will be necessary. As the Netherlands has experience with this, the aim is to deduce a model which can be copied and will lead to economic growth in the long run. Of course, the situation and characteristics of the Netherlands in 1945 cannot be compared to the current ones in conflict zones; however lessons can be learned from the past. On top of that, it would enable to make more efficient suggestions and plans which would be cost effective as less resources would be wasted on futile reconstruction projects.

Literature Review:

In the 50's a new type of activity experienced a new bloom; entrepreneurship. But what is entrepreneurship? Many researchers have quarreled over this. In 1990, Gartner a professor of entrepreneurship published a whole paper in which he studies all the facets of entrepreneurship. He however concluded that a clear picture still has to be defined (Gartner, 1990). Even though no one really agrees on the definition there are some recurring themes in this discussion. First of all, everyone agrees that the word originates from the French word "entreprendre"; which means to undertake. Furthermore, when one refers to an entrepreneur, one refers to a person who organizes and manages his own business. That person is self-employed and leads his /her business from his/her own initiative and at his own risk. Entrepreneurship is also a very broad term, as it can refer to a small shopkeeper up to a highly internationalized company (Gartner, 1990).

Therefore to complement, given that the economic regimes of the 21st century are highly globalized, rely more and more on international trade as well as on informational technologies; a more specific definition of entrepreneurship is required (Levin Institute, 2017). So; international entrepreneurship is a combination of innovative, proactive, and risk seeking behavior that crosses national borders and is intended to create value in organizations (Oviatt & McDougall, 2000).

Now that entrepreneurship has been defined, we can pursue by looking into the core of this research which is; to determine whether entrepreneurship actually leads and/or reinforces regional growth. And therefore determine if it is entrepreneurships that led to the rise of the Randstad as compared to the rest of the Netherlands. In order to properly respond to the hypothesis it is required to start at the beginning. Therefore this section will start by exposing the rise of the small firm, subsequently a glance into entrepreneurship as a driver of employment, innovation and growth will be taken.

During the "Golden Age of Capitalism", SME's experienced a huge increase in their number and became a big driver of employment after the war. Support for the small firm can be found in the writings of Carlsson (1992) who stated that; "There is now increasing evidence that the share of small business (firms and plants) in industrial output and employment has increased in most industrial countries during the last two decades". He offered two explanation for why the manufacturing industries shifted

towards smallness. First he stated in his research that, world competition at the time grew with a rise in globalization (commonly known from 1980's onwards (INVESTOPEDIA, 2015)) which implied higher competition. His second argument relates to technological progress; due to flexible automation firms preference shifted towards smaller firms which could be translated as diseconomies of scale (Carlsson, 1992). Therefore it can be stated that a preference for smallness in manufacturing arose in the 1980's.

In 2000, Foelster published a paper in which he studies the link between self-employment and overall total employment in Sweden between 1976 and 1995. He determines from his study that entrepreneurship does have a positive impact on regional employment rates (Foelster, 2000). However, he fails to specify whether this growth is lasting. This is an issue because if employment is only provided on a short run it does not have a lasting effect on growth. Hart and Hanvey had this intuition and pointed out in their work that even though SMEs create many jobs, they may not be persistent (Hart & Hanvey, 1997).

This phenomenon is not necessarily an issue though; Schumpeter's theory of creative destruction comes into play here. His view was that in any industry there is a continuous mutation that revolutionizes the economic structure. This revolution can be defined as simple evolution. However through this mutation the old instances are destroyed and make space for new ones. If we put this in parallel with the birth and death of SME's that create and destroy jobs this is not an issue as long as this revolution is beneficial to the market.

In order to determine whether this evolution is beneficial a new term has to be introduced; "turbulence". Turbulence refers to the flow of entry and exit in employment or a market. In 1946, Brown, Haltiwanger and Lane published a book in which they studied the influence of turbulence in 5 distinctive industrial sectors. Brown et al concluded that overall, turbulence is beneficial for a market as it makes industries stronger. However, this cannot be generalized to an overall policy; certain sectors of the market actually suffer from high turbulence. Sectors who employ a workforce with low skill requirement suffered from high turnover rates and the probability of the survival of the firm decreased (Brown, Haltiwanger, & Lane, 1946). Other research concerning turbulence was realized by Callejon and Segarra who tried to link

economic turbulence with increases in productivity of the factors of production in Spain from 1980 until 1992. Evidence of an increase in the productivity of the factors of production was found (Callejon & Segarra, 1999). The latest research on this was performed by Bosma and Nieuwenhuijsen who performed an identical investigation for the Netherlands from 1988 until 1996. A positive relationship was found once again between turbulence and increase of productivity in factors of production. However Bosma et al specified; this is only for the service industry. The manufacturing industry in contrary actually suffers from turbulence and a negative coefficient was found (Bosma & Nieuwenhuijsen, 2000).

Based on the previous paragraphs, it was established that entrepreneurship is a driver of employment (even though it is not necessarily long term) and that turbulences increases the strength of certain industries as well as the productivity of the factors of production; it is time to look into the relationship between entrepreneurship and actual economic growth.

A relevant piece of literature written by Wong, Ho and Autio, investigated this topic and declared that a high degree of entrepreneurship and new business creation in a country or region actually does not guarantee enhanced and faster growth rates. Therefore, entrepreneurship does not guarantee growth even though the two are correlated; but correlation is not causation. In their paper Wong et al. did however show that a specific type of entrepreneurship does lead to growth. Only the high growth potential entrepreneurs have an impact on economic growth (Wong, Ho, & Autio, 2005).

These entrepreneurial firms, also known as “gazelles”, are the ones that also generate the majority of long-term jobs and therefore have a positive impact on long-term growth (Birch, Haggerty, & Parsons, 1997). Carree and Thurik confirmed the previous findings and investigated further into the importance of entrepreneurship on the macro-economic level. They determined that entrepreneurship generates growth through being a vehicle of innovation. These SMEs, while exercising their business, will engender knowledge spill overs. Furthermore, in the current globalized regimes where modern comparative advantages rely on knowledge; the spill overs caused by the SMEs bring extra economic growth to their market (Carree & Thurik, 2002). This

phenomenon is in line with the “intensive” type of growth Europe experienced when they exhausted the catch-up opportunities (Eichengreen, 2007).

The previous statement, even though deemed reliable has to be nuanced; a valuable paper by Schmitz states that economists only focus on the direct production of SMEs. Furthermore he also specifies that only a small portion of SMEs actually innovate. Most of the other entrepreneur are in his words “passive entrepreneurs”. These entrepreneur simply implement and imitate the innovations generated by the small and high growth entrepreneurial firms. Through this process, they also contribute to economic growth but do not innovate themselves and refers to extensive growth (Schmitz Jr, 1989).

One additional paradigm has to be introduced at this point. As was established the 21st century is marked by intensive growth with new technologies that are mainly located in small firms who have the ability to evolve fast. In a paper published by Wennekers & Thurik (1999) entrepreneurship was tried to be linked to economic growth. From the final statements it was concluded that much research still had to be done. However several interesting findings were made; first they stated that entrepreneurship matters especially due to the evolutionary economics. With globalization and the ICT[5] revolution substantial resource reallocation has to be undertaken. This requires a lot of entrepreneurs who act like experimenters and through trial and error the economy evolves. Another interesting finding is their distinction between the Neo-Classical Paradigm and the Entrepreneurial Paradigm who frames the two mindsets of firms and their different ways of thinking. Additionally they specify that not only small firms act as entrepreneurs, however in bigger firms a distinct branch is created with a smaller size which allows for flexibility. Furthermore they state that on the actual way of how entrepreneurship affects growth little is known (Wennekers & Thurik, 1999).

The final paper that shall be discussed tries to link entrepreneurship to regional growth in the Netherlands. This research focused on how new firm formation impact regional growth. The first valuable finding is that the growth and actual effect of the new firm takes about 6 years to be felt. Second new firm formation has a positive effect on employment but this effect is limited. Furthermore new firms only have a positive effect

[5] ICT: Information and Communication Technologies

in more urbanized areas and the manufacturing industry. Subsidized areas have worse entrepreneurial activity which does not promote growth (Stel & Suddle, 2007). They also found evidence of an “agglomeration equilibrium” in the New Economic Geography in Europe, supporting the idea that non-peripheral agglomerations experience better growth.

Concluding Remarks for the Literature Review

Many findings were identified in the previous papers; however in order to get a clear picture of how entrepreneurship leads to growth a synthesis is required. Many researchers concluded that no actual evidence is available. However this does not mean that a general framework can be identified.

First, it was identified that entrepreneurship in the 21st century is based on innovation. Everything goes fast and information technologies are at the heart of growth. Furthermore as Wennekers & Thurik (1999) identified it is important to distinguish between information and knowledge. Information is available to all firms; however that is not the driver of the performance of firms. The real driver is their ability to transform this information into actual knowledge and it is from this knowledge that they can reap profits.

A second point that is identified is that competition between firms relies on a competition of ideas; this implies that firms need to move fast and get the product on the market quickly. This could support the emergence of hubs like Silicon Valley which are main drivers of growth in a region. A parallel of the Randstad being the Silicon Valley of the Netherlands could be made here.

A final important point is the importance of evolution, growth acts in a “Schumpeterian” maybe even “Darwinist” way that it is required to evolve. Big firms who used to be on the cutting edge of some technology failed to evolve and lacked creativity and now are insignificant on the market (for example Kodak who used to be the leader of photography).

To conclude, entrepreneurship leads to regional growth by being a driver of innovation; the entrepreneurial mind distinguishes itself from the neo-classical way of though by its small size, creativity and flexibility. As was identified previously, a migration of the young capital full population was also identified towards the Randstad. Furthermore,

the more eastern parts of the Netherlands are less connected and have older industries who do not innovate as much. Therefore the hypothesis that entrepreneurship acts as a driver of growth in the Randstad due to the young minds, high connection to the European Megalopole and therefore acts as a hub of innovation.

Theoretical Framework:

Given that the Netherlands is based on an economy that is driven by innovation to grow from the 70's onwards; and not only on increases in efficiency we can represent its growth function by;

$$Y = AF(L,K,H)$$

Furthermore, the aim of this paper is to provide evidence that entrepreneurship is a driver a regional growth rates, therefore the equation is presented in the following way;

$$\text{Rate Econ. Gwth} = c + a(1)\,\text{GwthProductivity/Capita} + a(2)\,\text{Gwth Capital/Capita} + a(3)$$

$$\text{Gwth FixCap.Investment} + a(4)\,\text{Gwth R\&D Investment}$$

$$+ B(1)\,\text{GwthSuccessOfSME's} + B(2)\,\text{Turbulence} + \text{ErrorTerm}$$

Growth of productivity and capital per capita are the main control variables. Given that the aim of this analysis is to provide evidence of entrepreneurship driving regional growth we have to control for the original drivers of growth which are labor and capital productivity. Therefore these two factors are part of the equation.

H0: COROP growth is driven by Labor Productivity Growth

H1: COROP growth is positively associated with Capital Growth

Investment in fixed capital is also included as it is part of extensive growth and therefore provides explanation for growth.

H2: COROP growth is positively associated with Investment in Fix Capital

Furthermore in the production we can find H which refers to human capital. Human capital in itself is pointless if not applied nor exploited. Therefore as a proxy for human capital R&D investment is used in order to control for it as it does eventually lead to growth.

H3: COROP growth is positively associated with R&D Investment

The growth of the success in SME's is the first explanatory variable. As we are looking at the marginal growth of the economy, the success of more SME's leads to more economic growth. Therefore this is the first actual research variable.

H4: COROP growth is positively associated with SME's success

The final factor is turbulence. This was computed by taking the sum of entry and exits in the market. This decision was motivated by the fact that on a yearly basis many firms are created but also destroyed. The failure by many of those firms hampers economic growth and therefore to make a proper evaluation of the contribution of SME's; we should look at the growth rates in turbulence.

H5: COROP growth positively associated with by Turbulence

In order to retain or reject these hypothesis, regressions will be used. This method is the most effective way to test the explanatory variable, entrepreneurship success corrected for failures.

Data:

The data employed in this analysis was retrieved from the Centraal Bureau voor de Statistiek (Statistics Netherlands) databank and was gathered by Broersma and Oosterhaven (2014). This center is an independently run organization which specializes in statistical analysis in service of the Dutch government and society.

As we presented in the previous section, for the purpose of the analysis we chose several variables which are Added Value, Labor Productivity, Capital productivity, Investment in R&D, Investment in Fixed Capital, Turbulence and Success Rate of SME`s. For each of these variables, data from 1990-2001 (except Investment in Fixed Capital which starts in 1996) was available. As this analysis is focused on the contribution from entrepreneurship to economic growth; growth rates for each variable were necessary.

Furthermore as can be identified on the above framework a Cobb Douglas growth function is being used. However in this analysis the aim is to perform liner regressions. Therefore in the final dataset it was required to modify the variables in order to preserve linear relationships. To do this each variable was transformed into its natural

logarithm which enables us to perform regressions. This insinuates that in the following sections log-log models will be used and elastic relationships observed. This implies that the coefficient for log X(i) will be referred to as elasticities.

Transforming the data into natural logarithms did however pose some issues. As mentioned beforehand growth rates were computed for each variable. This implies that not all the rates were per se positive. However in order to transform our variables into logarithms, positive rates were required. In order to do this a constant was added to all the variables before transforming them into logarithms. The elected constant was of 1 unit; this constant was chosen for its practicality due to the fact that even a rate of growth of 0 would still be nonexistent after transformation as log (1) = 0.

For each variable descriptive statistics were computed in order to get an approximation of their contributions and values. This table can be found in the Appendix and the most valuable information for each factor are described hereunder;

The variable Added Value refers to the brut enhancement of the economy and is used as a proxy for GDP growth. Its mean is of 4.5% with a deviation of (+.028).

Labor as well as Capital Productivity are the two main control variables for our dependent variable Added Value. Their means equal 1.4 and 2.4% respectively with standard deviations of (+.02) and (+.07).

Investment in R&D and Fixed capital are two additional control variables as they enhance the fit of the model. Their means are of 0.076 for R&D investment and of 0.032 for fixed capital with standard deviations of (+0.16) and (+0.0925) respectively.

Finally the two explanatory variables were described; SME's success was obtained by taking the total number of startups for each year as well as the amount of them which failed. From this, we got the total number of new SME's who are going to survive. We corrected for the SME's who will not make it as they do not favor growth but rather reduce growth. Subsequently we computed a growth rate from the generated variable. Finally we put these values in Stata and got for the variable a mean of 0.0063 and standard deviation of (+0.04575).

Last but not least, Turbulence. Turbulence refers the sum of entry and exits of SME's on the market. For this factor a mean of 0.4104 was found and a standard deviation of (+0.0509).

To get an estimate of the relation between the variables a table of correlation was generated and can be found below;

Correlation Table	lnAdd.Val	lnLabor	lnCap.	lnInvestmt	lnGwth SMEs	lnInvstFix Cap	lnTurblence
lnAdd.Val.	1						
lnLabor	0.4819	1					
lnCapital	0.4638	-0.2552	1				
lnInvest R&D	0.0867	0.0567	-0.0399	1			
lnGwthScs SMEs	0.02	0.1489	-0.2991	-0.0179	1		
lnInvstFix Cap	0.26	0.2163	0.0045	0.0635	0.0876	1	
lnTurblence	-0.0233	-0.0136	-0.1026	0.0418	0.0792	0.0687	1

Table 2: Correlation Table including the relevant and employed variables

As we can observe, Labor and Capital productivity are positively and strongly correlated with the growth in Added Value. The two additional control variables, Investment in R&D and Investment in Fixed Capital also have a positive effect even if limited.

Finally our two explanatory variables Turbulence and Rate of Success in SME's have respectively a negative effect and a very small effect. For Turbulence the correlation coefficient with Added Value is of (-0.0233) which is very small and could be considered insignificant even if negative. As for Rate of Success of SME's the value is of (+.02) which can also be considered insignificant.

Additionally it is important to specify that, this data is in the form of a panel with a yearly basis. This means that for the 10 years between 1990 and 2000; we have observations for each COROP (40 in total) and 7 variables.

The variables Added Value Corrected (for inflation) was simply considered in the analysis but then not included for their failure to provide additional explanatory value to the model. Therefore we mention their consideration for disclosure but will however not figure in the later results.

Methodology:

In order to provide the most explanatory results about the importance of entrepreneurship on regional growth; several separate experiments were undertaken.

The first experiment required dividing our data into separate years from 1990 until 2000. Subsequently we regressed Added Value on Labor Productivity, Capital Productivity, Investment in Fix Capital (from 1996 onwards only) as well as Growth of SME's and finally Turbulence. All the coefficients were then gathered in a table and the significant coefficients marked. The final step involved graphing our results into a table over time with the objective to provide an interpretable pattern.

The second analysis required combining the data of each year and each variable. This involved mutating the data towards panel data and subsequently regressing Added Value on Labor Productivity, Capital Productivity, Investment in R&D, Turbulence and Success Rate of SME's. This second experiment benefited from higher explanatory power due to a higher number of observations as the variables were regressed on all years at once.

The final step involved panel data once more, but this time an extra variable was added to the model, Investment in Fix Capital. This means that the concerned data will only run from 1996 until 2000. Even though we have less observations the model is still deemed powerful and of explanatory power.

In the following section two levels of significance will be employed. First significance at 5% which allows for the most precise results with $p<0.05$. However due to the results that the analysis was confronted to in some cases a significant levels which forced us to present result which are significant at 10%

Results:

The result section will be divided into two parts; the first part will present the results from the survey which is based on the yearly analysis. The second part will concern the regressions where the full data is observed at once.

As was stated previously; the yearly analysis regressed Added Value on Labor Productivity, Capital Productivity, Growth of Success of SME's, Turbulence and

Investment on Fixed Capital (from 1996 onwards). The relevant results were summarized in the following table:

Years	Adjusted R2	Lab.Prod	Cap. Prod	GwthSME	Turbulence	Invest.FixK
1990	0.8564	.9727	.4866	.0045	-.017	.
1991	0.9137	1.03	.4530	-.0245	.061	.
1992	0.6924	.8897	.3343	.0168	-.0617	.
1993	.4836	.3598	.195	-.0095	.1654	.
1994	.3790	.7282	.105	.0267	.1191	.
1995	.9204	.6794	.4768	-.2862	.014	.
1996	0.5672	.5580	.293	-2982	-.0438	-.0278
1997	.8590	.9589	.3737	.108	-.0738	.011
1998	.8983	.8174	.5373	-.0839	-.0647	-.0036
1999	0..8987	.7616	.4988	-.1928	.01754	0.00047
2000	.9301	.6557	.469	-.015	-.0342	.01968
Total	**0.75001**	**.76467**	**.3839**	**-.06855**	**.00744**	**0.0005**

Table 3: Regression Results from the Yearly Analysis (in green significant result at 5 %, in blue at 10%, in red insignificant)

The first observation that can be made is that not all years fit the data equally well. For the year 1993 the adjusted R2 is of (.4836) and the fit is even worse for 1994 with an adjusted R2 coefficient of (0.3790). This can be explained by an economic slowdown in the beginning of the 90's and therefore the classical factors did not contribute as much towards Added Value (CBS, 2017).

The second observation concerns Labor and Capital Productivity for which the elasticities are significant for all coefficients (except for labor in 1993). Therefore we can determine that both these variables have a relevant contribution towards economic growth.

The average for these two elasticities over the 10 studied years are; (+0.7647) for Labor Productivity and (+0.3839) for Capital Productivity. This mean that a 1% increase Labor or Capital productivity will increase added value by (+0.0076) or (+0.0038) respectively.

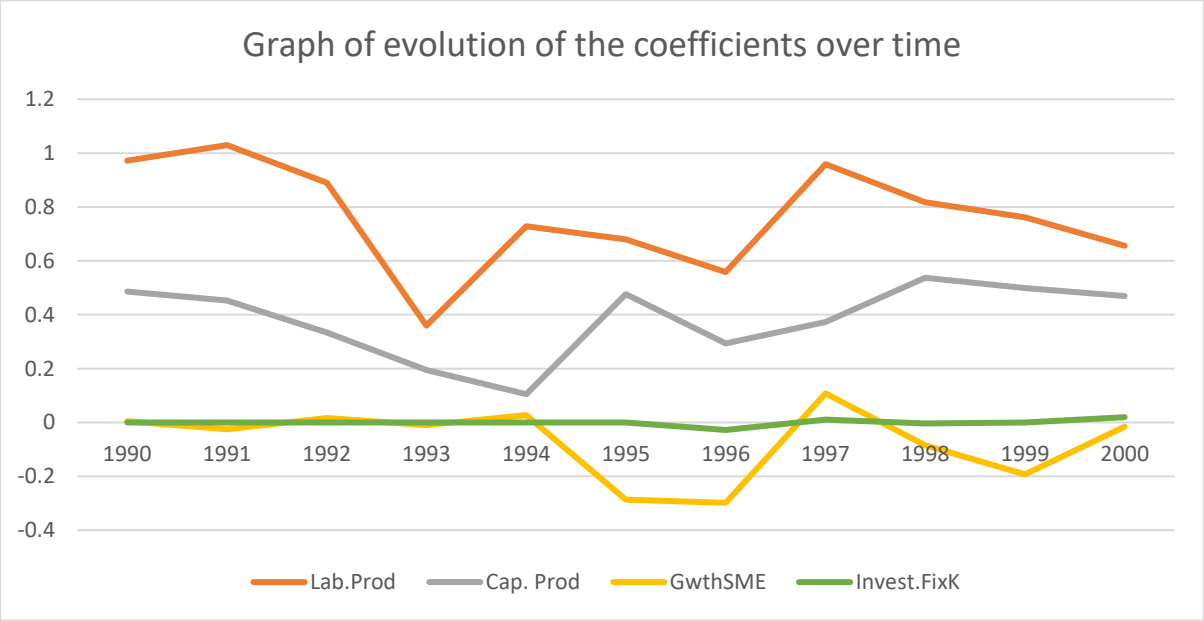
Such observation can however not be made for the explanatory variables. The factor Growth of Success of SME's has only one single significant results at 10% and therefore, nothing much can be determined at the moment.

As far as turbulence is concerned, 4 coefficients are relevant but only at a 10% significance level. That is for the years 1991 with a coefficient of (+0.037), 1992 with

an elasticity of (-0.0617), 1994 with a coefficient of (+0.1191) and for 1998 the coefficient is (-0.0647). This means that the coefficients are inconsistent in their contribution towards growth. Therefore a clear effect of turbulence on regional economic growth cannot be determined as of yet.

The final observation that can be drawn from this first experiment concerns Investment in Fixed Capital. As mentioned before the first proper observation is in 1996. However the only relevant coefficient was identified in 2000 at a 5% significance level and is equaled to (+0.01968).

To conclude, from the results presented so far, it was observed that only Capital and Labor are truly significant and drivers of regional economic growth due to their strong and positive elasticities. Furthermore Investment in fixed capital also contributes. Even though the coefficient of elasticity is positive the effect is limited and takes a while to be significant which makes sense as it is fixed capital and a characteristic of fixed capital is that it is not instantaneously available as it takes time to set it up and those investment are usually made on the long term.



In order to get an idea of how these coefficient evolve over time we graphed them in the chart that can be found here-above. As can be identified, Labor and Capital Productivity have an identical pattern. Investment in Fixed Capital is positive even though very limited. And finally Growth in Success of SME's was graphed, although

the factor is not significant it is an interesting fact that Capital Productivity and Growth of Success of SME's have an opposite trend. This trend seems however, to get a more identical trend with one another after 1996.

The failure of the initial model based on a yearly analysis is what drove the next experiment. As stated in the methodology, the following test concerns all the data for all years at once. This involved turning the data into a panel and then regressing it. This enabled a more valid analysis as it used more data and therefore more observations were used (440).

This time Added Value was regressed on Labor & Capital Productivity, Investment in R&D (which can be included in this analysis at it does not suffer from multicollinearity anymore), Growth of success of the SME's and Turbulence with robust standard errors.

R-sq overall	0.5987
Wald chi2(5)	349.93
Prob>chi2	0

LogAddedValue	Coef.	Rb.Std.Err	z	p>¦z¦
LogLabor	0.850353	0.063422	13.41	0
LogCap	0.286251	0.059094	4.84	0
LogInvest	0.007827	0.002644	2.96	0.003
LogGwtSMEs	0.008493	0.008493	1	0.317
LogTurb.	-0.01236	0.014573	-0.85	0.397
_cons	0.031401	0.006757	4.65	0

Table 4: Regression Table of variable from 1990-2000

The second model performs way better than the previous one; the following statement is based on several criteria. First of all the model consists in way more observations than the previous one and renders the analysis more credible due to the law of large numbers. Second, the control variables are significant at 5% at the exception of the explanatory ones (Growth in Success of SME's and Turbulence). Moreover, in this pursued model an extra variable, Investment in R&D was added and brought additional explanatory power to the model and is also significant.

From the regression we can determine that, as previously observed, Capital and Labor are the main contributors to Added Value at a regional level. This identical result is reassuring and supports the previous claims made based on the yearly analysis.

The marginal contribution of Labor Productivity to Added Value was observed to be (+0.852). As far as Capital Productivity is concerned the marginal contribution is at a height of (+0.272). The additional control variable; Investment in R&D, is also significant at 5% and has an elasticity of (+0.007826). The effect here is very limited which makes sense as R&D is very pricy and sometimes fails and causes the bankruptcy of firms.

The most relevant explanatory variables SME's Success, is sadly not significant in this case so, once again, we cannot draw any conclusion from it. The same goes for Turbulence therefore a subsequent model will be tested.

Based on the second test, it can be concluded that Capital, Labor and Investment in R&D are main drivers of regional growth at a 5% significance level. Furthermore it would seem that turbulence actually hurts the economy even though that effect is very limited and not significant at either a 5 or 10% significance level. Finally we cannot draw any conclusion from the importance of the growth in the success of SME's.

The final part of the results will consists in a presentation of an identical model to the previous one. However this time; we added Investment in Fixed Capital to the regression. Due to the fact that we only possess data for this at COROP level from 1996 onwards, the model is based on less observations (from 1996 until 2000). This however, is not at the expense of the explanatory power of the model and therefore we can make several credible observations from it. The results of the table can be found hereafter.

R-sq overall	0.7819

LogAddedValue	Coef.	Rb.Std.Err	z	P>¦z¦
LogLabor	0.752665	0.118399	6.36	0.00
LogCap.	0.398607	0.044493	8.96	0.00
LogInvest	-0.00074	0.004025	-0.18	0.855
LogInvestFC	-0.00307	0.006066	-0.51	0.613
LogGwthSME	-0.20477	0.083132	-2.46	0.014
LogTurb.	-0.0348	0.006066	-1.59	0.101
_cons	0.056291	0.011361	4.95	0.00

Table 5: Regression Table from 1996-2000

The first finding, here again; is the importance of Capital and Labor productivity w.r.t regional economic growth with elasticities of (+0.3986) and (+0.7526) respectively which are significant at a 5% level.

Second, the two investment control variables for fixed capital and R&D expenditure are both insignificant. This is an unexpected result as these factors did not suffer from such strong insignificance previously. The short span of the time frame of this study might be an explanation as it take time for investments to actually become lucrative and only involve costs in the first periods.

Finally, by looking at the two explanatory variables; Success Rate of SME's and Turbulence it can be observed that these variables finally have explanatory power. That is, Success of SME's is significant at 5% and Turbulence is significant at 10%. For these variables, negative elasticities were found and are equal to (-0.20477) and (-0.0348) respectively. This implies that SME's as well as Turbulence actually have a negative effect on growth at the regional level.

Conclusion:

Based on the provided results, it is now possible to respond to the suggested hypotheses.

The null and first hypotheses sketched Labor Productivity along Capital Productivity as drivers of regional economic development. These hypotheses concern the two control variables which all have significant coefficients at 5%. Therefore the two first conjectures are retained. Furthermore, it is possible to state that the effect of these two variables is positive and averages (+0.784) for the contribution of Labor Productivity and (+0.358) for Capital Productivity.

The two following hypotheses (2^{nd} & 3^{rd}) constitute the importance of Investments in growth. The third conjecture in this case can neither be rejected nor retained. From 1990 until 2000 the coefficient is significant at 5% and equal to (+0.0059). However when we studied the effect from 1996 till 2000 the coefficient was found to be negative even though insignificant. Therefore it is possible to state that R&D investment does not have an effect on the short term but has one on the long term even though it is very limited. Based on these findings, it can be determined that R&D does have an effect on regional growth even though it suffers from a time lag to truly impact causally growth. This can be explained by the risk behind R&D as it is uncertain and costly.

As far as Investment in Fix Capital is concerned, even though only a limited amount of observation are available; causal results were found. In the yearly regressions, the

only significant elasticity was identified in the 5th year and was equal to (+0.01968). Furthermore a rising trend over the years can be identified after graphing the elasticity coefficients over time. However upon doing an overall analysis the coefficient for Investment in Fix Capital was found to be insignificant and negative. Therefore no clear conclusion can be drawn as the results are inconclusive.

The final conjectures concern our explanatory variables; by this Success Rate of SME's and Turbulence are implied. Obtaining concrete results for these variables has proven tricky and only in the final model were both variables significant at 5 and 10% respectively. However through the realized observations it was established that both the hypotheses concerning these factors have to be rejected as their contribution towards added value is negative.

Policy Implications:

Based on the observations in the previous sections it was determined that; labor and capital productivity are the main drivers of regional economic growth. Furthermore, the contributions from investment in R&D and Fixed Capital have long term positive effects on growth. In the short run though, their effect is negative. Therefore further research should be undertaken to truly find causal results with more observations.

Finally, the main finding of this paper is that the success rate of SME's as well as turbulence have a very small but still negative effect on regional growth: so our main hypotheses is rejected and we have determined that entrepreneurship is not a true driver of growth but it is rather increases in productivity that brings growth.

Limitations and Recommendations for future research:

The main limitation of the suggested model is the small amount of observations for investment in Fixed Capital as data for previous years is unavailable. Another limitations of the model is the added constant. Due to the fact that growth rates were computed not all variables were positive. However as it was required to use the log-log model only positive values could be taken. Therefore a constant had to be added to the model. This does not so much affect the observations as we are interested in the variances more than anything however it does alter the data in itself.
Furthermore, more specific data is required for Entrepreneurship; only data about the total amount of SME's is available however there is no distinction between necessity

and opportunity entrepreneurship. This distinction is essential as opportunity entrepreneurs might have a higher probability to turn into a gazelle and they also truly innovate. The necessity entrepreneur launches in the business as his other options of employment are not viable or lucrative. On top of that, there is no indication concerning the potential or actual growth that the entrepreneurs experience.

This is an issue as we have showed that entrepreneurship actually has a negative effect on growth in the Netherlands from 1990 until 2000. This result is unexpected but might be explained by errors in data as there is a potential explanation for this result. Many SME's actually lose money in their first periods as they are only starting business and not yet lucrative. When they are finally launched and set in the market their exponential growth enables them to cover their previous loses and even make profits. Due to the limited time frame of the analysis no lags could be instigated just as for investment and therefore the analysis might be flawed and therefore more data is required to truly grasp the importance of entrepreneurship in growth.

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Appendix:

Years	GDP, per head of population (1000 PPS)	Growth Rates of GDP per capita	GDP, per hour worked (in US$, 2005 PPP)
1960	1.2	167.7%	-
1970	2.6	203.8%	-
1980	7.9	100%	-
1990	15.8	62%	37.3
2000	25.6	25.4%	46.2
2010	32.1	-	52.2

Table 1: Labor Productivity (adjusted with PPS)

Table 2: All COROP regions mapped

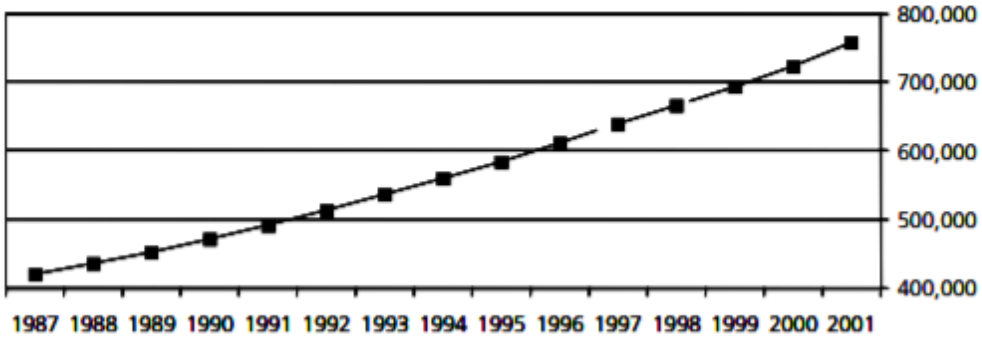
Regio	NbTimesAddedValue Above2%	Regio2	NbTimesAddedValueAbove2%2
Oost-Zuid-Holland	10	Noord-Limburg	6
Utrecht	10	Zuid-Limburg	6
Alkmaar en omgeving	8	Zuidwest-Drenthe	6
Zuidoost-Noord-Brabant	8	Zuidwest-Friesland	6
Delft en Westland	7	**Agglomeratie Leiden en Bollenstreek**	5
Flevoland	7	**Agglomeratie 's-Gravenhage**	5
Groot-Amsterdam	7	**Het Gooi en Vechtstreek**	5
Noordoost-Noord-Brabant	7	Noord-Friesland	5
Overig Groningen	7	Noord-Overijssel	5
Veluwe	7	Oost-Groningen	5
West-Noord-Brabant	7	Overig Zeeland	5
Zaanstreek	7	Twente	5
Zuidoost-Friesland	7	Zuidwest-Overijssel	5
Zuidoost-Zuid-Holland	7	**Agglomeratie Haarlem**	4
Zuidwest-Gelderland	7	**IJmond**	4
Arnhem/Nijmegen	6	Midden-Limburg	4
Groot-Rijnmond	6	Zuidoost-Drenthe	4
Kop van Noord-Holland	6	Achterhoek	3
Midden-Noord-Brabant	6	Delfzijl en omgeving	3
Noord-Drenthe	6	Zeeuwsch-Vlaanderen	3

Table3: Number of times growth was above 2%

DescriptiveTable	Obs	Mean	Std.Dev	Min	Max
Year	440	1995	3.165877	1990	2000
lnAddedValue	440	0.0458	0.0282654	-0.09824	0.160974
lnLaborProd.	440	0.013985	0.0201229	-0.1153	0.092688
lnCapitalProd.	440	0.024204	0.0696437	-0.20868	0.380648
lnInvestment R&D	440	0.076082	0.1620682	-0.31036	0.908709
lnInvstFixCap	440	0.032057	0.0925203	-0.4805	0.53659
lnGwthScsSMEs	440	0.006366	0.0457523	-0.2342	0.28298
lnTurblence	440	0.410377	0.0509693	0	0.566443

Table4: Descriptive Statistics

figure 2 Total number of businesses in the Netherlands 1987-2001



Sources: Bangma and Verhoeven, 2000, and EZ, Entrepreneurship Monitor 2001: fall.

Table 6: Amount of SME's over time

figure 3 Number of business owners as percentage of labor force for the Netherlands, 1972-1998

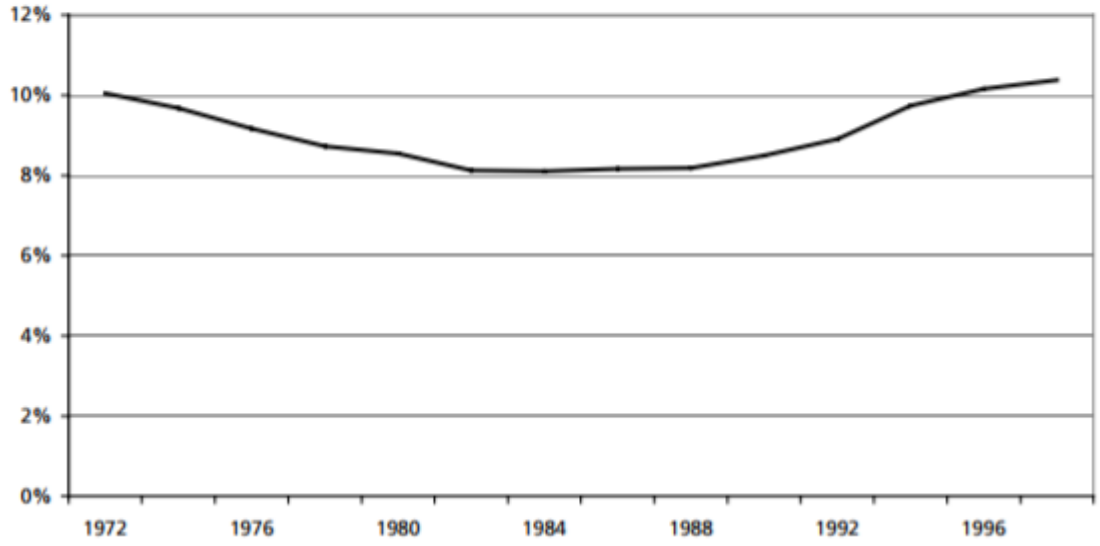


Table 7: Amount of SME's over time