

The economic effects of high skilled migration

‘The case of The Netherlands’

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Preface

Before you lies the final version of our Master thesis in Entrepreneurship, Strategy and Organisation Economics, named: The economic effects of high skilled migration, ‘The case of The Netherlands’. The choice for this topic is derived from our outward look on the world. We are both very interested in international labour mobility. This started in the courses on labour market and organisation that our coach Prof. Dr. Veenman provided. In particular we are very interested what the economic effects could be from changes in migration patterns on a small country such as The Netherlands. Despite our specific interests in the topic of migration, presenting this Master thesis is the result of hard work. It turned out to be a quite challenging subject; especially the lack of data challenged us in our research.

Our special thanks go out to our coach, Prof. Dr. Veenman for continuously guiding us through this Master thesis, and to our co-reader, van der Zwan Msc. for giving us helpful suggestions for the analyses made.

Furthermore, we would like to thank our parents, for their support in all the years that we have studied. They always kept motivating us to finish our study with good results. The last eight years we have studied together, during these eight years we have endured quite some challenges and completed quite some projects together. This master thesis is the final product of a collaboration that has existed for eight years, and probably will exist for many more years to come. Therefore, we are very proud with the final result that we present.

Finally, we declare that the text and work presented in this Master thesis is original and that no other sources than those mentioned in the text and its references have been used in writing the Master thesis. The copyright of the Master thesis rests with the author, Breur & Spronk. The authors are responsible for its contents. Erasmus School of Economics is only responsible for the educational coaching and beyond that cannot be held responsible for the content.

Yours Sincerely,

Sander Breur & Bart Spronk

Abstract

In this study, we investigate theories and empirics that relate to migration. In particular, the effects of native high skilled migration from the Netherlands on GDI (Gross Domestic Income), the level of entrepreneurship and health are investigated. In migration literature there has been little or no attention for migration from developed countries such as the Netherlands, as developed countries in general received more immigrants than it lost on emigrants. Therefore, this 'gap' in literature and empirics is understandable.

From 2003 until 2007, the emigration exceeded immigration in The Netherlands. This change in the migration pattern leads us to studying migration from The Netherlands. Particularly interesting is that there is an increase in emigration of high skilled individuals (roughly 36% in comparison to 20% of the total population). These high skilled individuals are crucial for an economy, especially for economic growth and for the ability to innovate. Therefore the focus of our research will be on the high skilled individuals. Due to data constraints we can only analyze the native Dutch high skilled migrants. We have chosen to investigate the effects of the emigration of this group on GDI, the level of entrepreneurship, and health, because we consider these as important economic indicators. GDI is explanatory for economic growth, the level of entrepreneurship is an important component of the innovative capacity of a country, and the level of health is an important input factor for human capital.

The results of our analyses are somewhat inconclusive, which is actually quite logical for an explanatory investigation. (1) When we observe the effect on the life expectancy (health), no significant relation is established. This result probably resides from the fact that the sample (native Dutch high skilled emigrants) is too small in comparison to the total population. (2) The level of entrepreneurship of The Netherlands is in a negative way affected by the outflow of high skilled workers. This could be a fact of concern for the Dutch government, but we urge not to rush to conclusions. Crucial on how this effect impacts the Dutch society is what these entrepreneurs will render in trade and networks. This could be an important area of further investigation. (3) Our final result is on the relation of the outflow of high skilled workers on GDI; there is no significant effect on GDI. Even when we include other variables that explain economic growth (in earlier empirical research), we find no significant relations.

This is probably due to constraints in the available data. Unfortunately, this investigation only includes 30 observations from the period 1977 until 2007.

With these results the first steps are made understanding the complex area of migration. We urge the Dutch government to increase the research on international mobility of laborers. In particular, migrants should be studied in their motivations, destination, ethnicity, and education. Only if all these data become available, conclusive results can be presented.

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Introduction

When we look back at the migration history of the Netherlands, some patterns are revealed. In the 17th and 18th century a relatively small number of migrants left the Netherlands. In these two centuries, no more than 10,000 people migrated to North America. In contrast to this period, from the mid-nineteenth century to the mid-twentieth century, the number of emigrants was higher than the number of immigrants. Zorlu & Hartog (2001) state that: “*After the mid 1840s, the total number of Dutch people who migrated to North America has been estimated to be around 250.000 (HIM, 2001) [...]*”

The prospect of higher earnings in North America led Dutch people to migrate. After the Second World War, The Netherlands experienced an emigration surplus in the recovery period of the economy until the early 1960s. The Netherlands recovered from the damaging effects of the Second World War, but the thriving economy was in need of a greater labour force, hence followed a period wherein the Netherlands attracted a large flow of labour migrants. This migration flow made it possible for the Dutch economy to grow and prosper. Since 1961 the annual immigration flows exceed the emigration flows systematically.

This changes in the year 2003 when there was an emigration surplus of 4,000 people, which increases in the following years 2004: 16,200, 2005: 27,400, 2006: 31,300, and 2007: 5,700. After a few years with an emigration surplus, in 2008 The Netherlands received more immigrants than it lost on emigrants. The change from an immigration surplus to an emigration surplus triggered us into doing this investigation.

Intuitively, the shift to an emigration surplus has economic consequences. Strangely enough, there is no clear picture of what economic effects occur in The Netherlands. After studying emigration literature and empirics, we conclude that the focus lies on the demographic consequences. It is well known who leave the Netherlands and what motivates these emigrants (NIDI rapport nr 75; “Weg uit Nederland “). Current literature and empirics cannot give a clear picture of the social and economic effects. The goal of this investigation is to analyze the economic effects of high skilled emigration.

The immigration flow has been investigated fiercely. The desire to explain immigration in developed countries has been considerable. Hence, in current literature there is quite some

data and empirics about the economic/demographic/ and social effects of immigration. The emigration flow has traditionally been of less importance to developed countries, such countries have always attracted (labour) migrants and worried less about emigration. However, there are several attempts in modeling the economic effects of emigration. A crucial difference between our investigation and these models is the subject of matter. While we focus on the Netherlands, which is a developed country, current literature and empirics of emigration focuses on developing countries. Clearly, our study opens a relatively new area in emigration. To fully investigate this new field and account for every economic variable is impossible. What we aim for in this investigation, is to map out some important economic variables in relation to high skilled emigration. The choices we have made will be explained from here on.

Important in our study is to understand what the emigration decision of one individual implies for a country. There are several effects to be noticed; demographic effects, social effects and economic effects. The NIDI (Nederlands interdisciplinair demografisch instituut) has specialized in studies on the demographic effects. Partially from this source we obtain some basic statistics of the emigration flow. There will be social effects when a relatively large portion of Dutch residents chooses to migrate. Social effects can be on culture, language, family reunion, etc. However interesting these variables may be to investigate, they are beyond the scope of this study.

Our focus will be on the economic effects. There are direct and indirect economic effects that occur when groups of individuals choose to emigrate. For instance, a direct effect can be observed on GDI (Gross Domestic Income) and through a surplus of (potential) remittances. Besides the direct measurable effects, there could be a redistribution of the labour market in The Netherlands. For this redistribution it is crucial to know who leaves the country; there are a lot of variables which can be used to analyze this (gender, occupation, labour status, age, education etc.). An important theory for our investigation is the human capital theory. Zeman (1955) states that; the two most important input factors of human capital are education and health. We choose to focus on the level of education of the emigrant; in particular we focus on the tertiary educated workers. This is done because in particular high skilled workers have great influence on economic growth and the innovative capacity of a

country. The tertiary educated part of the labour force in The Netherlands is roughly around 20%. In comparison to the tertiary educated part of the emigration flow, which is around 36%, this is quite high. As is noticed, the outflow of high skilled workers is relatively high, and we are interested what effect this has on GDI, the level of entrepreneurship, and health. The variable health will be tested by the life expectancy of the native population.

Entrepreneurs are seen as holders of a high amount of human capital, they are crucial to economic dynamism and the ability of a nation to innovate; we test if the departure of high skilled migrants affects the level of entrepreneurship in The Netherlands. We analyze GDI as a measure for economic growth. Important to notice is that emigration will only partially explain economic growth, and that there are other variables that are included to explain economic growth.

Our study will focus on the Dutch natives for two reasons; (1) there are not enough data available for the other groups (Western- and non Western immigrants), (2) Dutch natives received education in the Netherlands and therefore large investments have been made by society in this group. (3) The (expected) value to society for a native differs from other groups of emigrants such as return migrants (foreigners who come to The Netherlands to live there for a certain period and than leave), since a native is expected to contribute his whole life to society. Concluding, the following economic variables will be investigated: GDI, Level of Entrepreneurship measured as entering firms minus exiting firms, Health measured as average life expectancy of the native population.

Research question:

What are the economic effects of the emigration of high skilled Dutch natives from the Netherlands? We will investigate the departure of the tertiary educated part of the native Dutch working population (20-65). We are particularly interested in the effect on GDI, health, and the level of entrepreneurship.

The outcomes of our investigation will help us to better understand the comprehensive field of emigration. We will be able to determine the direction (negative/positive) and strength of the effects as mentioned above. As ‘pioneers’ in this field of study we will provide some preliminary conclusions about the costs and benefits of the high skilled emigration flow.

The study will begin by explaining migration. Important for the frame of our research is to determine what causes high skilled migration and what sort of effects can be observed, this will be done in chapter 1. Chapter 2 will focus on the importance of human capital in relation to migration. Chapters 1 and 2 are the theoretical basis of our research. Chapter 3 describes the data and methods we use to investigate the emigration flow. In Chapter 4 the results will be presented and will be discussed in Chapter 5.

Chapter 1: Migration

Emigration is the act of leaving the home country to live elsewhere. There are various perspectives to investigate emigration from. Important is to know who leaves a country, and what motivates the person to emigrate. Every migration decision includes a time frame; the moment and length of departure determine the impact on both the country of departure and the country of destination. The impact on a country depends on who decides to leave the country of origin. One can imagine that the departure of a scientist will have a different impact than the departure of a carpenter. On the national level, there can be different needs in terms of labour. A commonality of developed countries (such as The Netherlands) is that they prefer a labour force with a high educational attainment, this preference resides from the fact that the knowledge based economy (particularly in developed countries there is an increase in demand for 'knowledge') is growing. Therefore, the emigration of high skilled workers can have effects on the national economy. However, emigration from developed countries is an area of research which has received less focus, mainly because this hasn't been an important issue for a long time. Developed countries structurally received more immigrants than it lost on emigrants. Nowadays in The Netherlands, emigration exceeds immigration. Therefore, in this chapter we will use literature and empirics, to answer the question of what determines the emigration from the Netherlands, and what the effects the emigration from The Netherlands can be.

1.1 Determinants of (high skilled) emigration

There can be different sorts of determining factors of emigration; there can be economic or social motivations for leaving The Netherlands. The goal of this section is to understand what factors determine Dutch emigration.

“Differences in net income advantages, chiefly differences in wages, are the main causes of migration [...]”

John Hicks (1932) left a legacy for migration theory with his research; he concludes that the economic factor wage is the main determining factor of migration. When we take the theory of John Hicks and investigate the income levels of the OECD countries; we observe that there are only 6 countries in which income levels are higher (income levels are corrected for Purchasing power parity)¹ than in the Netherlands. These data do not seem to match with the basic migration theory; therefore we must investigate what other factors can determine Dutch emigration. The NIDI report (no.75) by Dalen & Henkens (2008) concludes that the emigration flow should not be explained by wage differences but by other variables.

“The average Dutch emigrant is highly educated and has high income perspective in the Netherlands. In the economic and social-psychological literature there can be various other explanations; (1) Networks and family households; the family household is a unity in which migration decisions are made. International networks play a great part in the migration decisions. (2) Psychological features of the international mobile individual; mainly the self-conscious adventurer’s need the tension of the international travel. (3) The Netherlands is a country which holds a high density population, wherein a lot of public goods are scarce. Goods such as nature, space, infrastructure accessibility are not for everybody available. This can be a driving force behind Dutch emigration [...]”

Strikingly, all of the findings of The NIDI are social determining factors, instead of the traditional economic determining factor (labour migration). Literature and empirics provide us with information about what kind of factors determine the emigration from The Netherlands. This is a rather complex case, and further investigation is necessary in order to understand the case of The Netherlands.

¹ These data are obtained from the OECD database (2007); “Employment outlook”

There have to be some commonalities of large emigrant groups to be able to gain a better understanding of the situation in The Netherlands. Ethnic origin is such a commonality. In particular when we observe the emigration flow by ethnic origin of the emigrant, native born- and foreign born emigrants, we can obtain a better understanding of these determining factors. Many foreign-born emigrants choose to return to their country of origin (1), the native born rather have different reasons to emigrate (2&3). Unfortunately, there are no detailed data available about these intuitive conclusions. There is literature and empirics that provides us with insight in the motivations of foreign-born emigrants: Borjas and Bratsberg (1996) provide us with two reasons why the outmigration of a foreign-born emigrant can arise:

“(1) First, the return migration may have been planned as part of an optimal life-cycle residential location sequence, wherein some immigrants migrate to for a few years to accumulate financial resources or other types of capital and then return to the source country. (2) Alternatively, return migration occurs because immigrants based their initial migration decision on erroneous information about the economic opportunities in. As long as return migration costs are relatively low, workers who experience worse-than-expected outcomes in may wish to return to their home country [...].”

The theoretical and empirical investigation only partially provides us with conclusive results determining factors of emigration from The Netherlands. Therefore, some predicting factors are discussed in order to gain more insight in the determining factors of emigration. According to the model of Borjas and Bratsberg (1996), a key determinant of the outmigration rate is the per capita GNP (Gross National Product) in the source country; immigrants tend to return to rich countries. This is a very important predictor for the eventual return of emigrants to the Netherlands. The theoretical model of return migration generates strong predictions regarding the size and skill composition of the population flows. The most striking implication is that return migration intensifies the type of selection that generated the immigration flow in the first place. In other words, if the immigrant flow is positively selected, so that immigrants have above average skills, the return migrants will be the least skilled immigrants. In contrast, if the immigrant flow is negatively selected, the return migrants will be the most skilled immigrants.

Conclusions

The determining factors give us an insight in motives of the decision to migrate. Particularly in the Netherlands there is quite a unique situation; the decision to emigrate is rarely based on economic motives but more on social-psychological motives. These assumptions can hold, because The Netherlands is one of the wealthiest nations in the world. But by lack of empirics supporting this we can't make very strong conclusions.

In case of return migration we find that the migrants that return are on average less educated than the migrants that don't return to the country of departure. Migrants tend to return to rich countries, in the case of The Netherlands this will result in a high return migration.

This paragraph serves as an introduction to the topic and gives both insight in the underlying theories and the motives of the Dutch emigrant, the following section will serve as the basis of our analysis.

1.2 Effects of (High Skilled) emigration

This section focuses on the consequences of high skilled migration. There are social and economic effects that occur from emigration. In this study we focus on the economic effects of emigration. This chapter serves as an exploration of these effects, and moreover it serves as an exploration of what current literature can provide us with to describe these economic effects. Traditionally, economic theory focused on labour market effects of emigration. However, there are several other economic effects that have to be accounted for. In this section we will focus on national development theories by investigating the direct and indirect economic effects.

1.2.1 Direct economic effects

The goal of this section is to create an overview of the direct economic effects that occur when a person decides to emigrate. In general, these effects depend on the question of whether the migrant is favorably self selected or not (Chiswick 2000). The more highly favourably selected migrants are, the more successful will be their adjustment in the destination and the more favourable their impact on the destination economy and society. Moreover, the more highly favourably selected are the migrants the greater, in general, will be the adverse effect of their departure on their origin. As we focus on higher educated migrants the knowledge of self selectiveness will be important for the effects that follow.

Financial obligations of an emigrant

There are some direct effects of emigration that can be measured. Some direct measurable effects are the losses of financial obligations to the government. In the Netherlands there are several of these obligations²: (1) Income tax is the largest fraction of these obligations, (2) The obligation to pay for insurances (“volksverzekeringen”) and pension, (3) Income from real estate and property (“onroerende zaken”), (4) and capital taxation. These financial obligations have direct impact on the government income when a person chooses to emigrate. Besides these obligations there can be a loss of (future) investments done by the emigrant, and of (potential) savings of the emigrant. Unfortunately there is little known about these financial flows in relation to emigration.

² These data can be found on the website of the Dutch capital taxation association; www.belastingdienst.nl/variabel/buitenland/particulieren

Government expenditures and remittances

On the up-side of the balance sheet are government expenditures and remittances. The government expenses can decrease when an emigrant leaves The Netherlands; particularly health care costs, social security costs, pension costs, etc will lower.

Remittances occur when an emigrant sends financial means back to the country of departure. Migrant remittances contribute to the migrant-sending economy in at least two ways: first, they increase national income; and second, they raise national income indirectly by providing foreign exchange and savings. Current literature has studied remittances mainly in the migrant movement from developing countries towards developed countries (remittances back to developing countries). Freeman and Oostendorp (2000) say the following about migration towards developed countries:

“In this process, migrants are the big winners. The earnings gaps between countries are so large, even for comparable workers, that there are very major income gains available for migrants [...]”

Hence, an important phenomenon migrant-sending countries benefit from, are the remittances. Current literature and empirics provide us with little evidence on what remittances mean to sending developed countries. No distinction exists in emigrants from developed countries or from non-developed countries. There is some theory available that can give us an insight in what role remittances might play in The Netherlands. For example Djajic (1986) concludes that non-migrants benefit from emigration, even if they do not receive any of the remittances themselves, provided that the magnitude of migrants' remittances exceeds a critical threshold roughly equal to the value of the production they would have produced, had they stayed. The problem again in this conclusion, is that it is made from remittances dependant countries, which are developing countries. Important for this investigation are measurement tools for remittances, according to Taylor et al (1996) the following tools can be used to measure remittances;

“(1) the magnitude of remittances; (2) the value or economic effect of foreign exchange provided by remittances; (3) the selectivity of international migration; and (4) the effect of remittances on domestic savings and investment and the impact of these savings[...].”

They are particularly important for measuring remittances to developed countries.

Economic growth

Important for this investigation is how emigration affects economic growth. According to Barro (1996) economic growth is dependant on several variables; schooling, health (measured as life expectancy), low fertility, low government welfare expenditures, the rule of law, favourable terms of trade, and political freedom. He concludes in his research that a positive relation exists between growth and these variables. A high level of inflation has a negative effect on economic growth. Stated is that 58% of the economic growth is explained by these variables mentioned by Barro. This implies that there are other variables that influence economic growth.

Conclusion direct economic effects

Theory and empirics provide us with some basic insights in what effects occur when dealing with high skilled emigration. The effects studied are applicable on this particular group of high skilled migrants, although there is little known about the case-specific effects of high skilled migrants. Important for this investigation is that some measurement tools are provided, with these tools we will analyze the effects of high skilled emigration on GDI, entrepreneurship, and health.

1.2.2 Indirect economic effects (labour market effects)

Taylor et all (1996) state that;

“In a perfectly competitive, neoclassical world (without surplus labor or other market imperfections), a worker is paid the marginal value of what he or she produces prior to emigrating [...]”.

Grubel and Scott (1966) argue that there should be no effect of people emigrating; although there can be a local effect on wages, the size of the market is still the same before the emigrant left, only there are less workers to ‘divide’ the same size of the ‘pie’. This finding however does not hold, with high, non-marginal, levels of emigration: the loss of emigrant labor reduces the productivity of complementary inputs such as land and capital; hence it lowers income payments to owners of these assets. *“Graphically, emigration results in an inward shift in the labor supply curve (from LS_0 to LS_1 in Figure 1a), which increases wages (from w_0 to w_1) for those who stay behind. At the same time, however, it reduces the marginal*

productivity of capital, as shown by the inward shift of the marginal product of capital curve from MPK_0 to MPK_1 in Figure 1b.

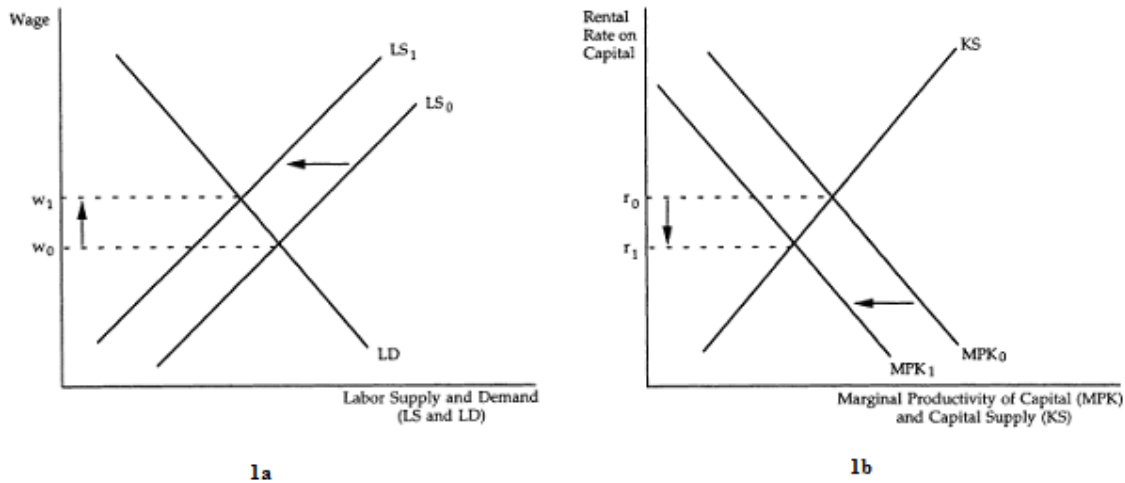


Figure 1a-b. Non-marginal Migration in a Neoclassical World

The latter shift causes a decrease in the returns to capital, or a drop in the marginal profit rate, from r_0 to r_1 . The net effect on the economic welfare of non-migrants depends on the size of the wage gains to local labor compared to the loss of profit accruing to owners of land and capital [...]. These conclusions do not hold in a country with a labour surplus; however The Netherlands is not characterized by having large surpluses of labour. This is a great difference between developed and developing countries, the latter which have received much more attention in literature and empirics.

Berry and Soligno (1969) try to clarify under what conditions emigration is harmful or beneficial. They conclude the following: “the emigration of labor is found to cause loss to the remaining population as a whole except where (a) the emigrant groups own a relatively large proportion of the capital stock or have relatively high wealth holding propensities and (b) they leave some or all of their capital behind them in the country [...]”. If both conditions hold, it will increase the capital to labour ratio for the non-migrants. The productivity of labour as well as the wages will increase because of a higher capital to labour ratio.

Conclusion indirect economic effects

The Netherlands currently deals with high levels of emigration. From theory we can conclude, that when dealing with high levels of emigration, the following effects occur: (1) it increases the labor supply and wages of the non-migrants and (2) it reduces the productivity of the complementary production factors capital and land; which results in a loss to land and capital owners. These effects do not occur when the emigrants have a high capital stock or high wealth holding propensities and leave some of this capital/wealth behind.

Chapter 2 Migration and human capital

When a person chooses to emigrate, the human capital of this person will be taken from the country of departure. The goal of this investigation is to determine what the effect of the emigration of high skilled workers is on GDI, entrepreneurship, and health. To do this, the underlying variables and theories will be investigated. Therefore, this paragraph will clarify what human capital is, and how high levels of high skilled migration can affect the country of departure. We will do this by first investigating human capital on the individual level and, secondly by investigating human capital on a national level. Special attention will be paid to education and health as components of human capital.

2.1 Human capital at the individual level

The Human Capital theory is the basis which we use to value the human capital of an emigrant. Human capital refers to the stock of skills and knowledge embodied in the ability to perform labour so as to produce economic value. There are many ways to invest in human capital, what these ways have in common is that they improve the physical and mental abilities of people and thereby raise real income prospects. To value an emigrant, we have to consider the 'value to society' of that emigrant. Weisbrod (1961) defines this value as followed:

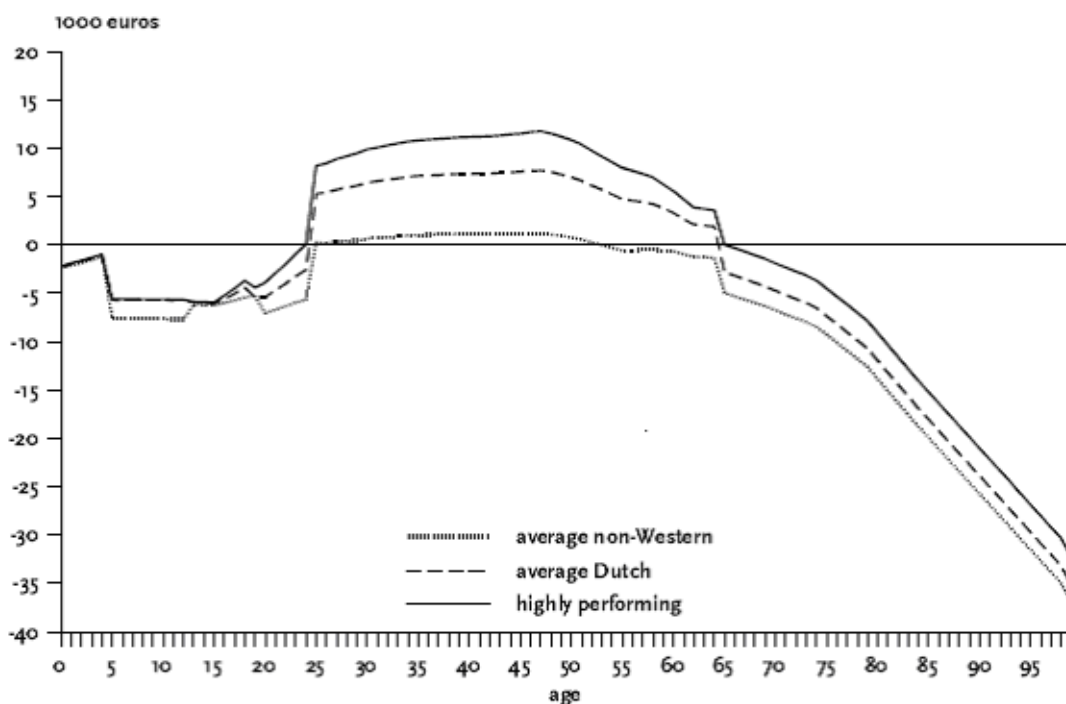
"Society is defined to include the entire population except the person being valued [...]".

In other words, the value to society shows what value this person is to others. According to Becker (1962), this can be measured by the input of schooling, on-the-job training, medical care, vitamin consumption and acquiring information about the economic system. Hence we can say that three variables form human capital: (1) Schooling, (2) On the Job training, (3) Health. Zeman (1955) identified that schooling and on the job training are the main determining factors of human capital. Even though these are the main pillars of human capital, it is crucial to investigate the health in relation to human capital. It sets the conditions which enable a person to perform, and thus is a determining factor for human capital.

Besides these input variables there are quite some data available about the value of human capital differing on gender. When investigating gender in relation to human capital, Vella (1994) concludes that gender does have a significant influence on the general level of human capital. The traditional attitudes of females influence their labour market behaviour and therefore affecting the average level of human capital of females.

The results depicted in the graph below, clearly indicate the necessity of distinguishing between experience and age in analyses of investment in human capital. In the study of Klevermarken & Quigley (Feb 1976), these results are known as cohort effects; variations that arise between in this case age, experience, and performance cohorts. The results are consistent with the interpretation that younger members of the same experience cohort are more efficient in producing human capital. This can be seen in a study on immigration in the Dutch economy of Roodenburg et al (2003), which presents Nett Added Value of different cohorts:

Figure 2 Age profiles of net contributions, 2001



In this figure we see an age profile of the net-contributions to the welfare state (three reference groups). These CPB findings are very important for our research and will be cited during the investigation. From this graph we conclude that at the age of 25, a person on average adds value to the society until the age of 65 is achieved. We can conclude that cohort

effects arise on age, ethnic origin and labour market status. The underlying factors which are actually measured are education, job training and health.

An interesting area of research is entrepreneurship, an entrepreneur is a person who organizes, operates, and assumes the risk for a business venture. These are often high skilled workers that hold high levels of human capital. Unfortunately there is little known of entrepreneurs and their level of human capital (at the individual level). More on entrepreneurship will follow in the next section (human capital at a national level).

Conclusion human capital at the individual level

From these findings on human capital we can conclude that education and health are the most important determining factors. By looking at different cohorts (age, ethnic origin and labor market performance) variations in the level of human capital arise. These variations all reside from the underlying determining factors. Education and health are the main pillars that form human capital, therefore the relations of education and health will be investigated further in the next sections.

2.1.1 Education

Particularly interesting for this investigation is what the returns from education are. Important in judging what effect high skilled emigration has on The Netherlands; is being able to measure the returns that are obtained from education.

Psacharopoulos (1995) refers in his study to the internal rate of return. This internal rate is used to calculate the returns from education, and can be viewed from a private or a social point of view. The private rate of return has two components, the costs incurred and the received benefits. The costs incurred are the foregone earnings while studying, plus any education expenditures. The benefits are the earnings that the educated individual earns in comparison to a lower educated control group. The social rate of return summarizes the costs of the educational investment from the state's point of view. The main computational difference with the private rate of return is that the social benefits aren't included in the social rate of return. Besides this technical difference, the investments that are done by the state are on average much higher than the average private investments. The social benefits are the non-monetary external effects of education, difficulties do arise with calculating these non

monetary external effects (usually monetary costs and benefits are used to calculate the social rate of return). Private returns are higher than social returns where the latter is defined on the basis of private benefit but total (private plus external) costs. This is because of the public subsidization of education and the fact that typical social rate of return estimates does not include social benefits. Obviously, difficulties still arise in estimating the social rate of return. Nevertheless we can conclude that the degree of public subsidization increases with the level of education, which has regressive income distribution implications. Interesting to note from Psacharapoloulos & Patrinos (sept 2002) is that the highest returns are noticeable for low and middle income countries.

Concluding we can say that because of computational differences the private rate of return is higher than the social rate of return. In the next section we will investigate the relation between education and health.

2.1.2 Health

The goal of this section is to investigate health as a part of human capital. Particularly interesting is in what manner the level of human capital has effect on the health of the emigrants. Important for this investigation is to be able to assign a certain level of health to the different emigrants in the emigration flow in order to investigate what effect the emigration of tertiary educated workers has on the non-migrants.

Human capital in relation to health is a topic that has been studied widely. There are various ways to measure diverse forms of health. The focus in this investigation is on the Dutch workforce. This workforce is defined as the population between 25-65 years of age. An annual health report of the Statistics Netherlands (CBS, "Gezondheid en zorg in cijfers 2008") provides us with some conclusions for the Netherlands; higher educated people have a 6 to 7 year longer life expectancy than lower educated people. Another conclusion is that the quality of life is perceived as higher by higher educated people; the difference in years of perceived good health is 16-19 years. From these empirics we can conclude that the educational attainment has a positive effect on health in The Netherlands: a high level of educational attainment has a positive influence on the level of health, measured by life expectancy and

perceived quality of life. The research of Ross and Wu (1995) acknowledges this positive relation between education and health. They provide us with the following explanations;

“(1 work and economic conditions) Compared to the poorly educated, well educated respondents are less likely to be unemployed, are more likely to work full-time, to have fulfilling, subjectively rewarding jobs, high incomes, and low economic hardship. Full-time work, fulfilling work, high income, and low economic hardship in turn significantly improve health in all analyses. (2 social-psychological conditions) The well educated report a greater sense of control over their lives and their health, and they have higher levels of social support. The sense of control, and to a lesser extent support, is associated with good health. (3 health lifestyle) The well educated are less likely to smoke, are more likely to exercise, to get health check-ups, and to drink moderately, all of which, except check-ups, are associated with good health. We conclude that high educational attainment improves health directly, and it improves health indirectly through work and economic conditions, social-psychological resources, and health lifestyle [...]”.

The positive relation between education and health strengthens the human capital ‘value’ of the high skilled migrants, which is important for this investigation.

Besides education there are various indicators for Health; such as sickness, disability etc. that lie outside of the scope of our investigation. Our goal in this section was to describe the influence that education has on health. We conclude that there is a positive relation between education and health. For our investigation this implies that the higher educated the emigrants are, the higher the average level of health will be.

2.2 Human capital on the national level

The goal of this section is to investigate what effects emigration has on the national level of human capital. The national level of human capital is equal to the sum of the individual levels of human capital together. This is important because it determines the innovative ability of a nation. In particular we are interested how entrepreneurship influences the ability to innovate.

2.2.1 Innovation

Besides observing human capital at the individual level, it can also be observed at the national level. According to Popescu (June 2005), individuals have abilities and skills that can be improved and so they can change the way they act. In his study is stated that human capital is seen to be an important source of competitive advantage to individuals, organizations and even to societies, having a huge capacity of innovation induction. All these individuals together form the national ability to innovate; the threat that too much high skilled workers emigrate from the Netherlands is intuitively detrimental for the ability to innovate. Barro (2001) states that; a higher initial stock of human capital signifies a higher ratio of human to physical capital. This higher ratio tends to generate higher growth through at least two channels: first, more human capital facilitates the absorption of superior technologies from leading countries (especially important for schooling at higher levels). Secondly, human capital tends to be more difficult to adjust than physical capital. Concluding from Barro (2001), we can state that when too much high skilled workers/ entrepreneurs emigrate the capacity to absorb technologies will diminish, and it will be harder to adjust an economy because of a diminished level of human capital.

Particularly nowadays, when the demand for knowledge is greater than ever, it is important to contain this knowledge. The following quote from an OECD study on innovativeness underlines this necessity:

“The move towards the knowledge-based economy has placed human capital in science and technology at the forefront of the policy debate across OECD countries, not just in the area of education and labour markets but also in science, technology and innovation policy.

Technological change is driving demand for skilled labour and spurring an upgrading of skills across economies [...]”³

Innovation can be measured on different levels; the focus has been on inputs (such as research expenditures) and outputs (such as patents). Traditionally, when we search outside of these indicators one important aspect of innovation is missed; the interactions among the actors. These interactions are essential in order to investigate innovation. The study of national innovation systems of the OECD (1991) directs attention to the linkages or web of interaction within the overall innovation system. Measuring knowledge flows and mapping national innovation systems are still in the initial stages as indicated by the immature level of most of the statistical indicators discussed. The measurement of knowledge distribution and interaction is difficult because there is a lack of data and information regarding this type of innovative activity. Conventional indicators (such as R&D expenditures, patents, production and trade in high-technology products) are significantly more robust but are able to draw only a rough picture of knowledge flows in the innovative process. It is possible to make preliminary conclusions based on innovation indicators, but this field of research is not advanced enough to make a clear conclusion on what effect emigration has on the national innovative ability.

2.2.2 Entrepreneurship

Closely linked to the innovative ability of the Netherlands is the level of entrepreneurship. The goal of this section is to clarify the link between entrepreneurship and innovation.

The OECD study measuring entrepreneurship (2008), gives us the following information about entrepreneurship and its link to innovation;

“Entrepreneurship is increasingly recognized as an important driver of economic growth, productivity, innovation and employment, and it is widely accepted as a key aspect of economic dynamism: the birth and death of firms and their growth and downsizing. As firms enter and exit the market, theory suggests that the new arrivals will be more efficient than those they displace. Existing firms that are not driven out are forced to innovate and become

³ This quote can be found in the OECD study (2000); “Mobilising Human Resources for Innovation”

more productive in order to compete. Many studies have given empirical support to this process of “creative destruction” first described by Joseph Schumpeter” [...].

When a significant level of entrepreneurs will emigrate, this will be detrimental to a country, because they are a key to economic dynamism. This is, however, a rather one sided view of the emigration of entrepreneurs because they can also act as a key player in the globalization process. This means that emigration can also be beneficial, mainly by increasing the networks and trade. In a case study of emigration from Hong Kong, from Wong & Salaff (1998), the same conclusion is made; the necessity to further investigate the network effects when dealing with emigration is underpinned. Unfortunately, at this point in time there are no specific data available about migrating entrepreneurs and what effects there are. What does exist is the Eurostat Entrepreneurship Indicators Program which provides us with different measurement variables; (1) number of enterprises, (2) enterprise births and deaths, (3) high growth enterprises.⁴ With these indicators we will be able to measure the impact of the departure of the entrepreneurs from the Netherlands.

Concluding we can state that entrepreneurship is an important driver of innovation, high skilled workers are the driving force behind innovation. However it remains difficult to account for all variables when studying the relation between entrepreneurship and innovation.

Conclusion migration and human capital

From entrepreneurs to office clerks every individual contains a unique level of human capital. Human capital is the derivative of different variables, as we can conclude by studying the literature and the empirical evidence. Education (and job training) and health are the variables that form human capital. Human capital will change during a lifetime and progresses while a person ages and gains experience and education. It is detrimental for a country when high skilled workers/entrepreneurs leave the country, particularly when large groups of skilled workers choose to emigrate, it will harm the innovative capacity of a country.

⁴ *The OECD study (2008)*; “Measuring Entrepreneurship, a digest of indicators”, provides us with some early measurement tools for measuring entrepreneurship.

Chapter 3: Hypotheses, Data and Methods

This chapter describes the methodology and data sources used to analyze high skilled emigration for The Netherlands in relation with the variables GDI, level of entrepreneurship and health. Roughly, the dataset combines data on stocks of emigrants, economic indicators and data on the social expenditures on different levels of educational attainment. The composition of this chapter is as followed: first the research question and the corresponding hypotheses are discussed. Subsequently the collected data on emigration stocks and economic indicators will be closer investigated. When it is clear which data and economic indicators are used, the methods of analysis will be described. The lack of availability of some data leads us into making assumptions, which finally will be discussed.

Research question and hypotheses

The main goal of this investigation is to analyze if the outflow of high skilled Dutch natives has an influence on the economic situation of The Netherlands. The research question as mentioned before is as follows: *What are the economic effects of the emigration of Dutch high skilled natives from the Netherlands?* We will investigate the departure of the tertiary educated part of the Dutch native working class (20-65). We are particularly interested in the effect on GDI, the level of entrepreneurship and health.

Since our investigation analyzes a new field of research, we can state that this will be an explanatory investigation. The main goal is to test if there are significant relations between high skilled emigrants and the mentioned economic indicators for The Netherlands. The following hypotheses are formulated to analyze the data:

Hypothesis 1

H0: Changes in the emigrant stock of Dutch high skilled natives do not have a significant influence on Gross Domestic Income for the Netherlands.

H1: Changes in the emigration stock of Dutch high skilled natives have a significant negative influence on Gross Domestic Income for the Netherlands.

Hypothesis 2

H0: Changes in the emigrant stock of Dutch high skilled natives do not have a significant influence on the level of entrepreneurship for the Netherlands.

H1: Changes in the emigration stock of Dutch high skilled natives have a significant negative influence on the level of entrepreneurship for the Netherlands.

Hypothesis 3

H0: Changes in the emigrant stock of Dutch high skilled natives do not have a significant influence on the life expectancy of the Dutch native population aged 20 till 65.

H1: Changes in the emigrant stock of Dutch high skilled natives have a negative significant influence on the life expectancy of the Dutch native population aged 20 till 65.

To be able to test the hypotheses we collected and combined emigration data with economic figures for The Netherlands. The following section describes which data is collected and how it is analyzed.

Emigrants stocks

The data in our dataset can roughly be divided in emigration data and economic figures. In general there are sufficient data available about migration. However, a problem that is encountered is that the majority of this data represents immigration topics. There is much less information available about emigration. Due to this constraint we are forced to do approximations for some variables. Important to mention is that we use emigration stocks instead of emigration flows. Because by analyzing the effects of emigration, it is advisable to use emigration stocks, Docqueir and Marfouk (2005) came up with the following argumentation:

“Stock variables are more appropriated to analyze the endogeneity and the dynamics of migration movements (the equilibrium values are often expressed in terms of stocks). Regarding statistics, it has long been recognized that migration flow data are less reliable than stock data, due to the impossibility of evaluating emigration and return migration movements [...]”.

Since there are no data available on emigration stocks (only emigration flows) for The Netherlands in the period from 1977 till 2007, we have calculated the emigration stocks and

had to make some assumptions. In this investigation it is assumed that the first emigration flow from The Netherlands was in 1977. This implies that the stock at the end of 1977 exists only of the emigration flow in that year minus the return migration flow. The stocks are calculated with the emigration flows obtained from databases of Statistics Netherlands (CBS) for the period of 1977 until 2007. Together with percentages for return migration it is possible to calculate the stocks of emigrants. Some empirics of return migration state that about 55% of the emigrants with the Dutch nationality had returned before the seventh year. The first years after the emigration decision the return percentages are the highest.⁵ Assumed is that there will be no more return migration after six years.

The emigrant stocks are calculated by adding up the previous emigration stock with the annual inflow of emigrants. Since there is also return migration, the emigration stock will be reduced with the annual return migration flow. The calculation of the emigrant stock of Dutch natives can be drawn up as follows:

$$ESt = (ESt-1 + EFt) - (RFt + RFt-1 + RFt-2 + \dots RFt-5)$$

In which:

ESt = Emigration Stock of Dutch Natives end of year t

EFt = Emigration Flow of Dutch Natives in year t

RFt = Return migration Flow of Dutch Natives in year t. (RFt is calculated for year t until t -5, six periods in total, since we presume that there will be no more return migration after 6 years.)

The percentages for the return migration flows are assumed to be as follows based on the data provided in the NIDI report⁶:

Year t, 18%, Year t-1, 7% Year t-2, 7%, Year t-3, 6%, Year t-4, 5%, Year t-5, 4%,

⁵ These data are obtained from *Dalen, H. van & Henkens, K. NIDI (2008); "Weg uit Nederland, Emigratie aan het begin van de 21^e eeuw"*, we will refer to this source at the NIDI report (2008)

⁶ The NIDI report (2008)

The calculation of the emigrant stock of high (or low) skilled Dutch natives is quite similar:

$$ESH_t = (ESH_{t-1} + EFH_t) - (RFH_t + RFH_{t-1} + RFH_{t-2} + \dots + RFH_{t-5})$$

In which:

ESH_t = Emigration stock of high skilled Dutch natives end of year t

EFH_t = Emigration flow of high skilled Dutch natives, calculated as a percentage of total Dutch native emigration flow. These percentages are calculated with the help of the database of Docquier and Marfouk (2005) regarding emigration stocks divided by educational attainment and also by data provided in the NIDI report (2008). Those percentages are unfortunately not available for all the investigated years. Therefore, the percentages of the missing years are approximations based on interpolation.

Those percentages are also applied on the return migration flows. Hence, we presume that if the emigration flow in year t exists for 36,7% of high skilled people, the return migration flows of this emigration flow will have the same percentage of high skilled people for year t until $t-5$.

Important remarks

The decision to emphasize only Dutch natives implies that we leave the foreign-born emigrants unobserved. Furthermore the focus of this research will be mainly on the high skilled part of the Dutch natives aged between 20 and 65 years. High skilled emigrants are those with at least tertiary education. The justification for only examining the emigrant stocks of high skilled Dutch natives is as follows:

- (1) Since we focus on high skilled people, we exclude people younger than 20 years because it is very rare to complete a tertiary education before the age of 20.
- (2) Furthermore, we focus on the labour force since this group has the biggest influence on the economic situation of the Netherlands.
- (3) We assume that Dutch native emigrants are educated in The Netherlands and hence they have fully taken advantage of the government expenditures on education. As stated in the theory, higher educated people are more beneficial for society due to higher social returns (compared to lower educated people). The social returns on education can be expressed as benefits for the society as a whole. Those benefits are for example represented by higher

economic growth, more human capital, less crime and improved health care, which are presented by Saxton (2000) .

The private returns on education can be expressed as benefits on the level of the individual due to, for example, increases in income. Since we focus our research on the effects of high skilled emigration on The Netherlands as a whole we exclude private returns.

Besides the higher expected returns, the investments in higher educated people were also higher than for low educated. Therefore, the emigration decision of a high skilled native in comparison to a “low skilled”⁷ native will imply a greater loss for the Dutch society.

(4) Concluded from data in the NIDI report is that the percentage of high skilled native emigrants (36%) is high in comparison to the percentage of the native population which is qualified as high skilled (21,2%).⁸ This remarkable fact encourages us to reveal the impact of the outflow of high skilled Dutch natives.

Empirical results for native Dutch high skilled emigrant stocks

The stock of Dutch high skilled emigrants changed remarkably over the investigated period. Since it is assumed that there was no emigration before 1977, we start with a stock of zero. During the investigated period the total stock of Dutch natives increased till 563.243 emigrants in 2007, in that year the high skilled emigration stock accounts for 40,4% of the total stock.

The graph in appendix 1 shows the fluctuations (emigration flow minus retour migration per year) in the stocks of high skilled and “low skilled” emigrants in the period from 1977 until 2007. These fluctuations indicate if and to what extent the emigration stocks change in comparison to the preceding period. As long as they have values above zero they identify an increase in the emigration stock. The graph shows that the difference between high skilled and “low skilled” people becomes smaller over time, there are even two years (2003 & 2007) in which the net increase of high skilled people exceeds the net increase of “low skilled” people. The same pattern can also be observed by looking at the yearly emigration flows, over the total period the percentage of high skilled emigrants as part of the total native emigration flow rises noteworthy.

⁷ “Low skilled” workers are primary or secondary educated.

⁸ Percentages correspond with the year 2000 and they take into account Dutch Natives 15-64 year. Data is obtained from;the NIDI report 2008

Economic indicators

The dataset contains (besides data on emigration stocks) different indicators which represent a part of the economic situation in The Netherlands during the period from 1977 until 2007.

The main indicators which will be tested are Gross Domestic Income corrected for inflation (GDI), level of entrepreneurship, and health.

Gross Domestic Income

The variable Gross Domestic Income is explained as the total amount of the primary incomes (wages, rent, interest, profit) of all the sectors in an economy. GDI can also be seen as Gross Domestic Product increased by the amount of primary income from abroad. In the dataset the GDI is corrected for inflation by correcting all the values according to the price level in 2000. The data covers the period 1977 until 2007.⁹ As we will test the relation between high skilled emigration and GDI it is important to remark that the fluctuations in GDI are caused through several factors. Therefore the database also includes indicators for some of those factors.

Barro (1996), found that the variables life expectancy, fertility rate, government consumption, rule of law index, terms of trade change, democracy index, and inflation rate all have a certain influence on the real per capita GDP. Due to a lack of available data and the fact that we only have 30 observations we could only use the following variables:

- (1) Life expectancy: we measure life expectancy as the unweighted average of life expectancy of men and women together.¹⁰ The variable life expectancy will also be used as the indicator for the health situation of the Netherlands. Hence this variable will be tested in a regression with the high skilled emigration stock variables.
- (2) Fertility rate: we measure the fertility rate as the amount of newborn persons per thousand (of the average population per year, source; CBS, table birth figures).
- (3) Government consumption: we measure the expenditures of the government mainly done on areas such as defense, regulations, environment protection, infrastructure, economic development, public politics, etc.¹¹

The regression between GDI and high skilled native emigrants will be extended with the above mentioned variables. By adding those variables the regression will be more useful since

⁹ Source: CBS, Statline database Table National Accounts, Macro Economic Figures. 1977 till 2007

¹⁰ Source: OECD Health Data 2008

¹¹ Source: CBS, Statline database Table National Accounts, Macro Economic Figures. 1977 till 2007

it is likely that fluctuations in GDI can not be explained solely by the number of high skilled emigrants.

The final goal of this regression is that it will enable us to state whether a causal relation exists between GDI and high skilled Dutch emigrants.

Level of Entrepreneurship

The other indicator which is used is level of entrepreneurship measured as the number of firms in The Netherlands changing over time due to the number of newly established firms minus the number of liquidated firms in a year. Every enterprise where at least somebody is working for more than 15 hours a week is registered as a firm. This data are available for the period 1987 until 2004.¹²

Health

To analyze the effect of high skilled emigration on health the variable life expectancy is used (the same variable as used in the regression on GDI). The theory states that higher educated people on average have a longer life expectancy of 6 to 7 years compared to lower educated people. In our investigation we will analyze if the outflow of high skilled people has got a negative effect on the average life expectancy of the whole Dutch population.

Empirical results for economic indicators

Appendix 2 presents the empirical results of the mentioned economic indicators over the last years. In the period from 1977 until 2007 GDI has increased from 231.967 to 495.765, an increase of 114% over 30 years. When investigating the level of entrepreneurship, we observe that the average amount of yearly established firms is 53.244. The average number of liquidated firms on yearly bases is 22.689. The total stock of firms in The Netherlands increases from 434.667 in 1987 to 822.767 in 2004. The dataset also includes a variable which represent the fluctuation of the level of entrepreneurship. Concluded from this variable is that the average increase in the level of entrepreneurship is 3,8%. The corresponding graph shows that there was a quite stable growth in the level of entrepreneurship until 2002 of around and about 4%. From the year 2002 on, there is a remarkable decline in the growth

¹² Source: CBS table, Entrepreneurial climate business demographic dynamics in the Netherlands.

percentages of the level of entrepreneurship. We will investigate further if the outflow of high skilled natives had an effect on this decline.

Furthermore, the table shows that the average life expectancy for Dutch natives in the period from 1977 until 2007 was 77,2 years. The average fertility rate in the same period was 12,4 new born per thousand persons. The government expenditures increased from 24.374 millions of euro to 48.184 millions of euro an increase of 97,7% over a period of 30 years.

Methods of analysis

Before the methods of analysis are explained, it is important to state that the dataset contains a small number of observations for each variable. Due to a lack of available data we were not able to collect more than 30 ($n = 30$) observations (years 1977 till 2007) for each variable. Furthermore the dataset contains time series variables. This may lead to difficulties when it comes to regressions since autocorrelations can occur. In this section, we will explain which methods are used to get the most reliable results.

With the hypotheses the potential relationship between emigration and the economic indicators will be tested. The linear regression will test if there is a significant relation between the dependent variables (GDI, the level of entrepreneurship, and health) and the independent variable high skilled emigrants. It is expected that for all hypotheses a negative significant relationship will appear. In order to be sure about the validity of the regression certain assumptions have to be tested. The difficulty in analyzing our data lies in the fact that we deal with non-stationary variables (time series). In general, regression models for non-stationary variables give spurious results. There are several solutions to improve the regression between two non-stationary variables: (1) Using differenced variables which imply that instead of using the single observations of a variable, the differences between two subsequent observations will be taken, and (2) using the method of cointegration, which makes it possible to analyze time series in a regression. The method of cointegration is very complex and will not be used here, although in further investigations it can be a useful tool to analyze the effects of high skilled emigration of Dutch natives on the Netherlands.

Since we use economic indicators with observations for subsequent years it is plausible that autocorrelation between the observations occur. To avoid incorrect results, we created time lag variables of the differenced variables. Using those time lag variables in the regression creates the possibility to analyze the postponed effect of an independent variable on the dependent variable. The autocorrelations function in SPSS indicates how many time lags should be used to avoid autocorrelation. That gives the following result: GDI, Government consumption, life expectancy, and fertility rate are reliable without any time lag, level of entrepreneurship is reliable after 1 time lag, Native high skilled emigrants is reliable after 4 time lags.¹³

Regression models

The regression between the differenced variables for GDI and native high skilled emigrant stocks, life expectancy, fertility rate and government consumption can be described as follows:

$$Y(t)-Y(t-1)=a1*(x(t)-x(t-1))+a2*(x(t-1)-x(t-2))+a3*(x(t-2)-x(t-3))+a4*(x(t-3)-x(t-4))+b*(z(t)-z(t-1))+c*(z(t)-z(t-1))+d*(z(t)-z(t-1))+u(t)$$

In this regression the yearly growth of GDI is explained by the yearly growth in high skilled emigrant stocks in the years t-N, life expectancy in year t, fertility rate in year t and government consumptions in year t.

The regression between the yearly growth in level of entrepreneurship and the high skilled native emigrants stocks can be described as:

$$Y(t)-Y(t-1)=a*(x(t)-x(t-1))+a2*(x(t-1)-x(t-2))+a3*(x(t-2)-x(t-3))+a4*(x(t-3)-x(t-4))+u(t)$$

¹³ These observations are depicted in appendix3

The regression between the yearly growth in health and the high skilled emigrants stocks can be described as:

$$Y(t)-Y(t-1)=a*(x(t)-x(t-1))+a2*(x(t-1)-x(t-2))+a3*(x(t-2)-x(t-3))+a4*(x(t-3)-x(t-4))+u(t)$$

The results of the regressions is analyzed and discussed in the next section of this investigation.

Actual & Potential contribution

The dataset contains variables which indicate actual contributions and others represent the potential contributions of the emigrants. The potential contribution of an emigrant can be seen as missed income due to the departure of the emigrants. It can be measured by examining the missed tax incomes. Also by relating emigration to GDI, the level of entrepreneurship, and health, it can be analyzed if The Netherlands suffers from missed potential incomes due to the migration of their high skilled people.

In contrast to the potential contribution we reveal whether there are ways in which the emigrants contribute even if they are not in their home country anymore; the so-called actual contribution. In the case of an emigrant his actual contribution is represented by the remittances he sends to relatives. The variable GDI also incorporates (besides the total amount of primary incomes of all the sectors in a country) the received primary income from abroad. This primary income from abroad is the actual contribution of the emigrants.

Conclusion

The gathered data analyzed with the above described methods can provide a good notion about the effects of high skilled emigration on the economic situation in The Netherlands. It is important to keep in mind that some important assumptions apply on this investigation. In the following chapter the results will be discussed followed by the most important conclusions.

4. Results

In this chapter we will answer the research question; *what are the economic effects of the emigration of high skilled Dutch natives from the Netherlands? We will investigate the departure of the tertiary educated part of the native Dutch working population (20-65). We are particularly interested in the effect on GDI, health, and the level of entrepreneurship.* We state explicitly that the results should be interpreted as indicative and preliminary. They are of interest because the regression analyses show if relations exist between high skilled Dutch native emigration and economic indicators. It is important to realize that the regressions are based on thirty observations only. First the effect of high skilled Dutch native emigration on GDI is presented, followed by the results for the level of entrepreneurship, and finally the results for health. The section ends by an overall conclusion regarding the results.

High skilled emigration and GDI

The analysis starts with the relation between the dependent variable GDI and the independent variables high skilled emigration, life expectancy, fertility rate, and government consumption. The goal of this regression is to identify if high skilled Dutch native emigrants have a significant effect on GDI. As mentioned before, GDI is a complex economic indicator which is dependant on more than only changes in the composition of the population due to emigration.

The hypotheses which are tested are as follows:

H0: Changes in the emigrant stock of Dutch high skilled natives do not have a significant influence on Gross Domestic Income for the Netherlands.

H1: Changes in the emigration stock of Dutch high skilled natives have a significant negative influence on Gross Domestic Income for the Netherlands.

The model RSquare of 0,336 shows the explanatory value of the independent variables on GDI, in this case the explanatory value is 33,6%. Unfortunately none of the independent variables has got a significant effect (significance level of 10%) on GDI. Hence, it is not possible to reject the null hypothesis. This implies that we have to state that it is not possible to conclude that high skilled native Dutch emigrants have a significant effect on GDI. Neither

do the differenced variables of life expectancy, fertility rate, and government consumption. Probably due to the fact that the regression is based on only 30 observations there are no significant results.

Regression between GDI and high skilled native emigrants			
Rsquare	0,336	Reliable	
Variables	Beta	P-value	Significancy
Native HS emigrant stocks difference	-0,5914	0,345	No
Native HS emigrant stocks first difference	0,6052	0,417	No
Native HS emigrant stocks second diff.	0,4349	0,410	No
Native HS emigrant stocks third diff.	-0,3436	0,163	No
Life expectancy difference	0,1561	0,550	No
Fertility rate difference	0,2883	0,236	No
Government consumption difference	0,2805	0,253	No

Barro (1996) shows that there is a significant relation between the per capita GDP and educational attainment of the population (positive effect), life expectancy (positive effect), fertility rate (negative effect) and government consumption (negative effect). He collected data for roughly one hundred different countries for the years 1960 to 1990. Besides the mentioned variables, other variables are included: rule of law index, terms of trade change, democracy index, and inflation rate. The model of Barro including all those variables, got established on a Rsquare of around 58%.

The variable educational attainment of the population (measured as male secondary and higher schooling) has a positive effect in Barro’s model. It can therefore be assumed that a decrease in the stock of secondary and higher schooled males, due to migration, will sort a negative effect on GDI. Indirect, Barro’s findings indicate a negative effect of emigration of skilled males on GDI.

With the results of our regression, it is not possible to confirm whether those results also apply for The Netherlands.

High Skilled emigration and level of entrepreneurship

After analyzing the relation between emigration and GDI for The Netherlands the investigation will proceed by testing the relation between emigration and the level of entrepreneurship. The hypotheses which are tested are as follows:

H0: Changes in the emigrant stock of Dutch high skilled natives do not have a significant influence on the level of entrepreneurship for the Netherlands.

H1: Changes in the emigration stock of Dutch high skilled natives have a significant negative influence on the level of entrepreneurship for the Netherlands.

Regression between level of entrepreneurship and native hs emigrant stocks			
Rsquare		0,821	Reliable
Variables	Beta	P-value	Significancy
Level of entrepreneurship first difference	1,0569	0,000	Yes
Native HS emigrant stock difference	-0,8588	0,017	Yes
Native HS emigrant stock first difference	0,6135	0,186	No
Native HS emigrant stock second differenc	-0,4494	0,163	No
Native HS emigrant stock third difference	0,1808	0,214	No

The RSquare of this model is 0,821. The results presented above show that the fluctuations in the high skilled emigrant stocks have a significant negative effect (on the 10% significance level, $P = 0,017$) on the fluctuations of the level of entrepreneurship. Because of this significant relation we will reject the null hypothesis in favour of the alternative hypothesis. So, when the emigration stock of high skilled Dutch natives increases with one, the level of entrepreneurship decreases with 0,8588.

There is no significant effect noticeable for the lag variables of high skilled emigrant stocks. On the other hand, the fluctuations of the level of entrepreneurship in year $t-1$ have a significant positive effect on the fluctuations of the level of entrepreneurship in year t . This indicates that if the level of entrepreneurship in year $t-1$ grows with 1, the level of entrepreneurship in year t will grow with 1,0569.

Interesting about the results is that the outflow of high skilled Dutch natives has a significant detrimental effect on the amount of firms in The Netherlands. However, important to keep in mind, is the fact that our regression tries to explain the fluctuations in the level of entrepreneurship only by the delayed (time lag) effect of the level of entrepreneurship and the high skilled Dutch native emigrants. In reality there are more variables affecting the level of entrepreneurship. When the regression will be extended with more variables the results can differ from the ones showed here. The R-square of 0,821 is an indication that the model does not show a causal relation which is important to keep in mind by valuating the results. Hence, for future research it is recommended to create a model in which the level of entrepreneurship is not only explained by the emigration stocks of native Dutch high skilled.

High skilled emigration and Health

The last indicator for the economic situation of The Netherlands which will be tested is the relation between emigration and health. The variable health represents the life expectancy measured as the unweighted average of life expectancy of men and women together. Before presenting and discussing the results a comment has to be made. Similar to the level of entrepreneurship and GDI, health measured as life expectancy is a complex variable which can not be explained purely by the emigration stocks of high skilled Dutch natives. Nevertheless it is interesting to analyze whether the outflow of high skilled people affects the life expectancy for the population of the home country. The hypotheses which are used to test the relation are:

H0: Changes in the emigrant stock of Dutch high skilled natives do not have a significant influence on the life expectancy of the Dutch native population aged 20 till 65.

H1: Changes in the emigrant stock of Dutch high skilled natives have a negative significant influence on the life expectancy of the Dutch native population aged 20 till 65.

Regression between health and native hs emigrant stocks			
Rsquare	0,406	Reliable	
Variables	Beta	P-value	Significancy
Native HS emigrant stock difference	0,2334	0,226	No
Native HS emigrant stock first difference	0,5921	0,200	No
Native HS emigrant stock second difference	-0,1761	0,700	No
Native HS emigrant stock third difference	0,4477	0,031	Yes

According to the Rsquare, around 40,6% of the dependent variable is explained by the independent variables. Of all independent variables used, only the third time lag of the native high skilled emigration stock has a significant influence (on the 10% significance level, $P=0,031$) on health. This result implies that an increase of the native high skilled emigration stock in year $t-3$ with one results in an increase of the life expectancy with 0,4477. In the theory the following is stated: higher educated people have a 6 to 7 year longer life expectancy than lower educated people.¹⁴ This statement is not confirmed by the results. Although we found one significant relation it is not possible to state that high skilled emigration of Dutch natives has a significant effect on health. Therefore the alternative hypothesis has to be rejected and we have to accept the null hypothesis.

¹⁴ A CBS study (2008); “Gezondheid en zorg in cijfers 2008”

Conclusions

The intention of this explanatory investigation was to test relations between native high skilled emigration and the economic indicators for The Netherlands. One of the difficulties of our investigation is the lack of available data and the limited amount of observations. Due to these restrictions the results are not optimal. Even though they are not optimal we can conclude that the effects of high skilled native emigrants are not very extensive for the economic situation of The Netherlands. In the following chapter the results of the investigation will be further discussed.

5. Discussion

The goal of this study was to answer the following research question; *what are the economic effects of the emigration of high skilled Dutch natives from the Netherlands? We will investigate the departure of the tertiary educated part of the native Dutch working population (20-65). We are particularly interested in the effect on GDI, health, and the level of entrepreneurship.* This has been investigated because of an increase of emigration levels in The Netherlands, in particular the segment high skilled emigrants increased severely. Intuitively, we reasoned that this increase of high skilled emigrants can have negative effects for The Netherlands. The results that we obtained from the analysis are somewhat inconclusive. We specifically state that the results have to be interpreted carefully. In fact we can state that the results raise more questions than they have answered. This is actually quite logical for an explanatory study. In this chapter the findings will be discussed.

High skilled emigration and GDI

The results do not give any indication that there exists a significant relation between GDI and the outflow of high skilled natives. The absence of such a relation can be a consequence of the constraints of the available data, and the methods used to analyze these data. However, it is imaginable that GDI (which is a very complex variable) is not influenced by changes in the educational attainment of the population caused by the emigration. To further investigate the effect of high skilled native emigration from The Netherlands, there can be other economic indicators which are influenced by high skilled migration. Attempts to increase the amount of observations will also be helpful to improve the results.

Further research should also focus on other groups of emigrants besides the high skilled native emigrants, such as the lower skilled natives or the return migrants. A cross country investigation for the relation between high skilled emigration and GDI for several developed countries (comparable to The Netherlands) may generate some interesting results.

High Skilled emigration and level of entrepreneurship

The level of entrepreneurship of The Netherlands is in a negative way affected by the outflow of native high skilled workers. This could be a fact of concern for the Dutch government, when high levels of entrepreneurs depart from The Netherlands this can pose a threat for the

innovativeness of the Dutch society. However, we urge not to rush to conclusions especially since the result indicates a relative small negative effect. Crucial on how this effect impacts the Dutch society is what these entrepreneurs will render in trade and networks. When an entrepreneur decides to migrate from The Netherlands there will be an opportunity in a country abroad. Depending on this opportunity and the specific case, there can be links to the country of origin. Trade networks can result in Dutch companies profiting from the migrating entrepreneur, besides cash and trade flows, innovation through networks is an important phenomenon. These critical notes will be an important area of further investigation. In particular the impact of migrating entrepreneurs on the Dutch society is an interesting area of investigation.

High skilled emigration and Health

The final part of the results section describes the relation between health and native high skilled emigration. The regression does not show strong effects on life expectancy caused by the outflow of high skilled native emigrants. This seems positive for the total remaining Dutch population since it implies that their life expectancy is not negatively influenced by the outflow of high skilled people. Further investigation in the relation between high skilled emigration and other health variables is recommendable.

Underlying our investigation is the effect of the return migrants. Our stock variables fluctuate due to the emigration and the return migration of high skilled people. Therefore, the effect of returning high skilled people is included in our analysis in an indirect way. Since the return migration only concerns a small part of the migration flows it is not analyzed in detail. Although for further research it is important to investigate if and to what extent those return migrants can contribute to the economy of their country of origin.

With these conclusions the first steps are taken in understanding the complex area of migration. A subgoal of this investigation was to create an economic model with which we could determine the effect on an individual basis. Unfortunately this goal has proven to be too over-ambitious and lies beyond the scope of this thesis. This will be an eventual goal for this field of research; to model every effect that occurs when high skilled (or low skilled) workers emigrate. Particularly interesting is to make a costs/benefits analysis of the invested funds by society in this worker, and the returns on investment of this particular worker. This knowledge could be of great value to Dutch policy makers, particularly since in a globalizing economy the movement of individuals will become a more observed phenomenon.

References

- Barro, R.J.;*
(2001) "Human Capital and Growth"
(1996) "Determinants of economic growth"
- Becker, G.S. (oct. 1962);*
"Investment in Human Capital; a theoretical analysis"
- Berry, R.A. & Soligno, R. (1969);*
"Welfare aspects of International migration"
- Borjas and Bratsberg (1996);*
"Who leaves? The outmigration of the foreign born"
- Chiswick, B.R. (March 2000);*
"Are immigrants favorably Self-Selected? An economic analysis"
- CBS study (2008);*
"Gezondheid en zorg in cijfers 2008"
- CBS Statline database
"Table National Accounts, Marco Economic Figures. 1977 till 2007"
"Entrepreneurial climate business demographic dynamics in the Netherlands"
- CPB Notitie (2007);*
"Selectief arbeidsmigratie: Europees of nationaal? Het beleidsplan Legale Migratie van de Europese Commissie onder de loep"
- Dalen, H.van & Henkens, K (2008);*
"Weg uit Nederland; Emigratie aan het begin van de 21^e eeuw"
- Djajic, S. (1986);*
"International migration, remittances and welfare in a dependent economy. Journal of Development Economic"
- Docquier, F. & Marfouk, A. (March 2005);*
"International Migration by Educational Attainment (1990 – 2000) Release 1.1"
- Freeman, R.B. & Oostendorp, R.H. (2000);*
"Wages Around the World: Pay Across Occupations and Countries"
- Grubel, H. & Scott, A.D. (1966);*
"The international flow of human capital. American economic Review"
- Hanushek, E.A. (1996);*
"Measuring investment in education"

Hicks, J. (1932);

“Theory of wages”

Katseli, L.T. & Lucas, R.E.B. & Xenogiani, T. (june 2006);

“Effects of migration on sending countries: what do we know?”

Klevermarken, A. & Quigley, J.M. (Feb 1976);

“Age, experience, Earnings and investments in Human capital”

Marginson, S. & Weko, T. & Channon, N. & Luukkonen, T. & Oberg, J. (2008);

“OECD reviews of tertiary education”

Martins, J.O. & Boarini, R. & Strauss, H. & de la Maisonneuve, C. & Saadi, C.;

(2007) “The policy determinants of investment in education”

(2007) “OECD reviews of tertiary education”

Morton, Z. (September 1955);

“A Comparative Analysis of White-Non White Income Differentials”

OECD studies

(1991); “National innovation systems”

(2000); “Mobilising Human Resources for Innovation”

(2008); “Measuring Entrepreneurship, a digest of indicators”

OECD databases

(2007); “Employment outlook”

(2008); “Educational attainment of OECD countries”

(2008); “Health Data”

Popescu, C. (june 2005);

“Human capital and innovation”

Pscharopoulos, G. (1995);

“The profitability of Investment in education; concepts and method”

Psacharapoloulos, G. & Patrinos, H.A. (sept 2002) ;

“Returns to Investment in Education: A Further Update”

Roodenburg, H. & Euwals, R. & ter Rele, H (June 2003);

“Immigration and the Dutch Economy”

Ross, C.E. and Wu, C.L. (1995);

“The links between education and health”

Saxton, J. (Joint economic Committee United States Congress January 2000);

“Investment in education: Private and Public Returns”

Taylor, J.E. & Arango, J. & Hugo, G. & Kouaouci, A. & Massey, D.S. (1996);
“International Migration and National Development”

Vella, F (1994);
“Gender roles and human capital investment; the relationship between traditional attitudes and female labour market performance”

Weisbrod, B.A. (1961);
“The Valuation of Human Capital”

Wong, S.L. & Salaff, J.W. (1998);
“Network capital: emigration from Hong Kong”

Zorlu, A. & Hartog, J. (2001);
“Migration and Immigrants: The Case of The Netherlands”

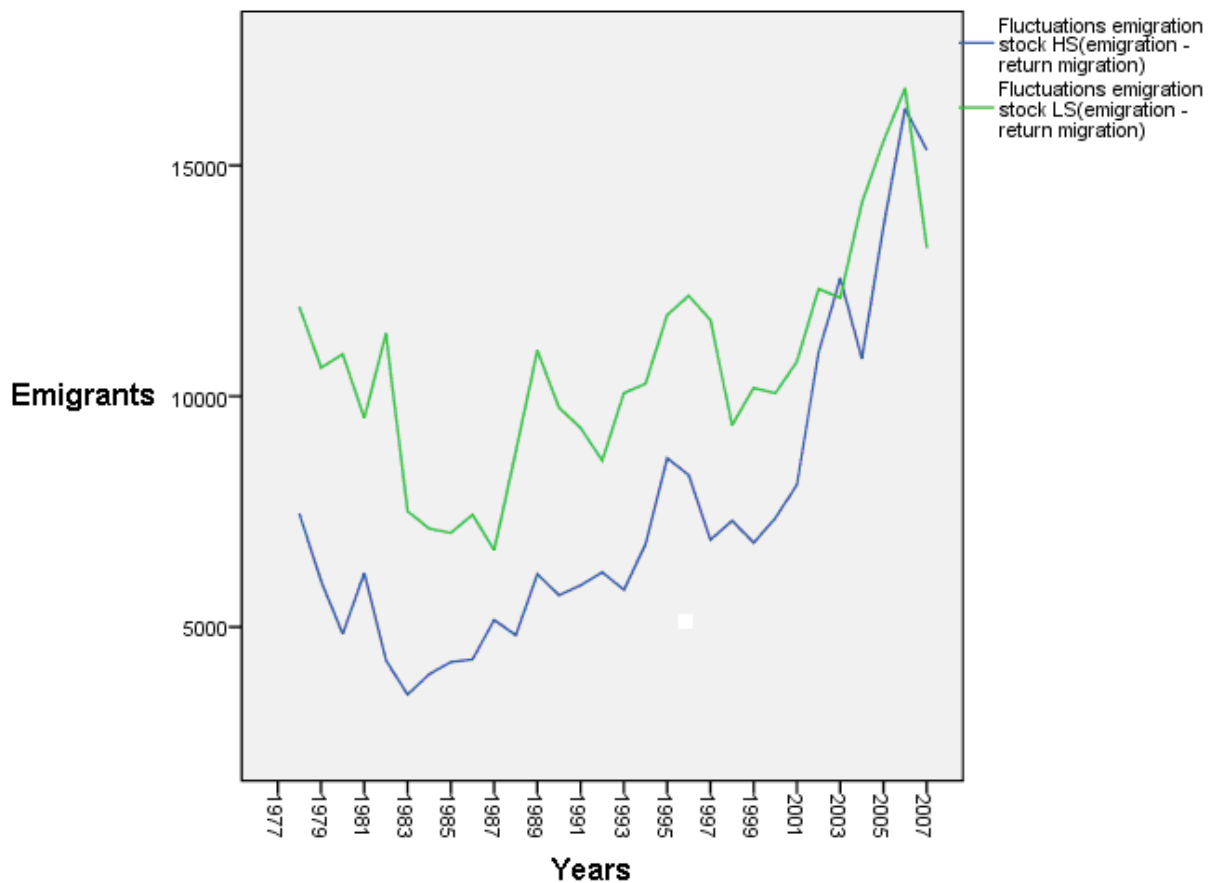
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www.belastingdienst.nl/variabel/buitenland/particulieren

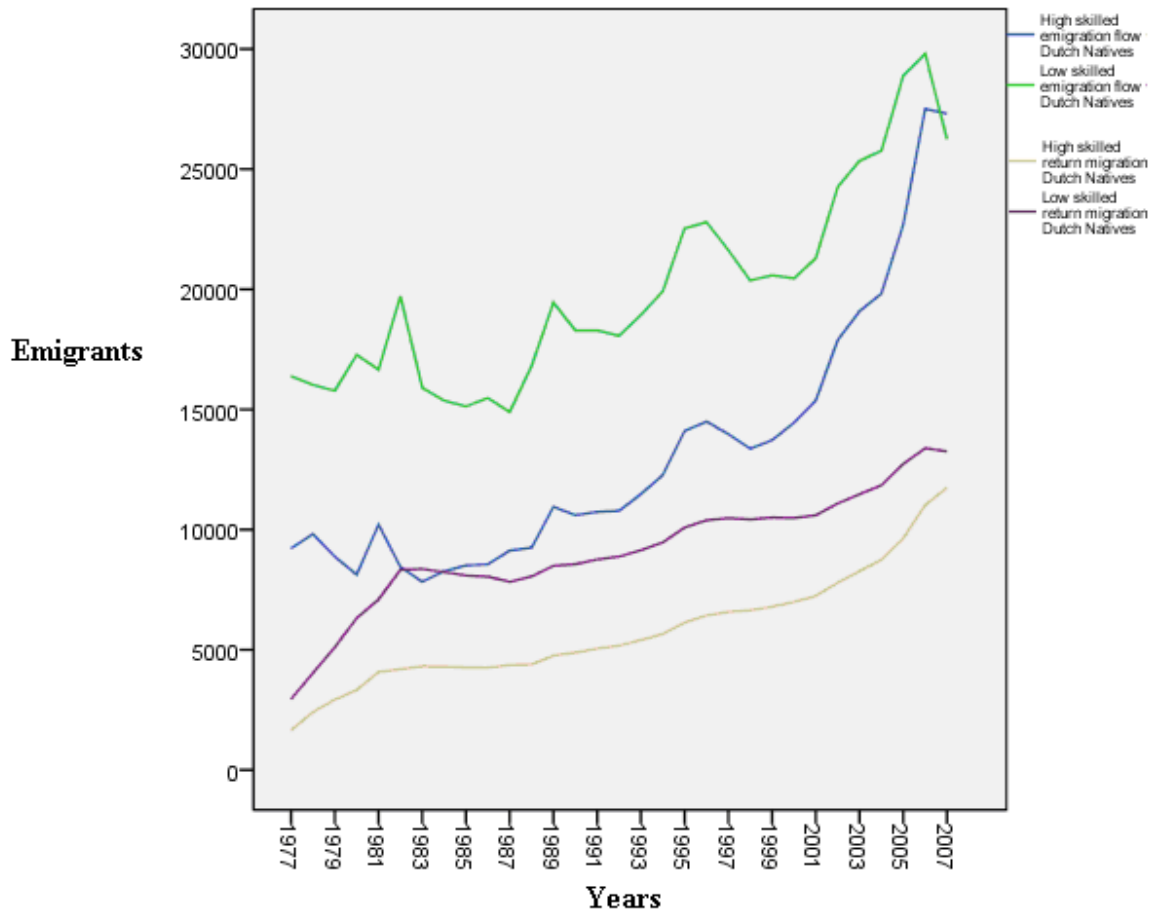
Appendix 1 Emigration stocks for The Netherlands 1977 till 2007

Descriptive statistics	Values			
	Minimum	Maximum	Sum	Mean
Total native emigrant stock	21.002	563.243	7.994.716	257.894
Native 'high skilled' emigrant stock	6.931	231.231	3.006.258	96.976
Native 'low skilled' emigrant stock	14.071	3.321.012	4.988.458	160.918
Fluctuations emigration stock 'high skilled'	3.538	16.229	224.300	7.477
Fluctuations emigration stock 'low skilled'	6.670	16.673	317.941	10.598

Fluctuations in the emigration stocks divided by educational attainment for the Netherlands in the period from 1977 till 2007.



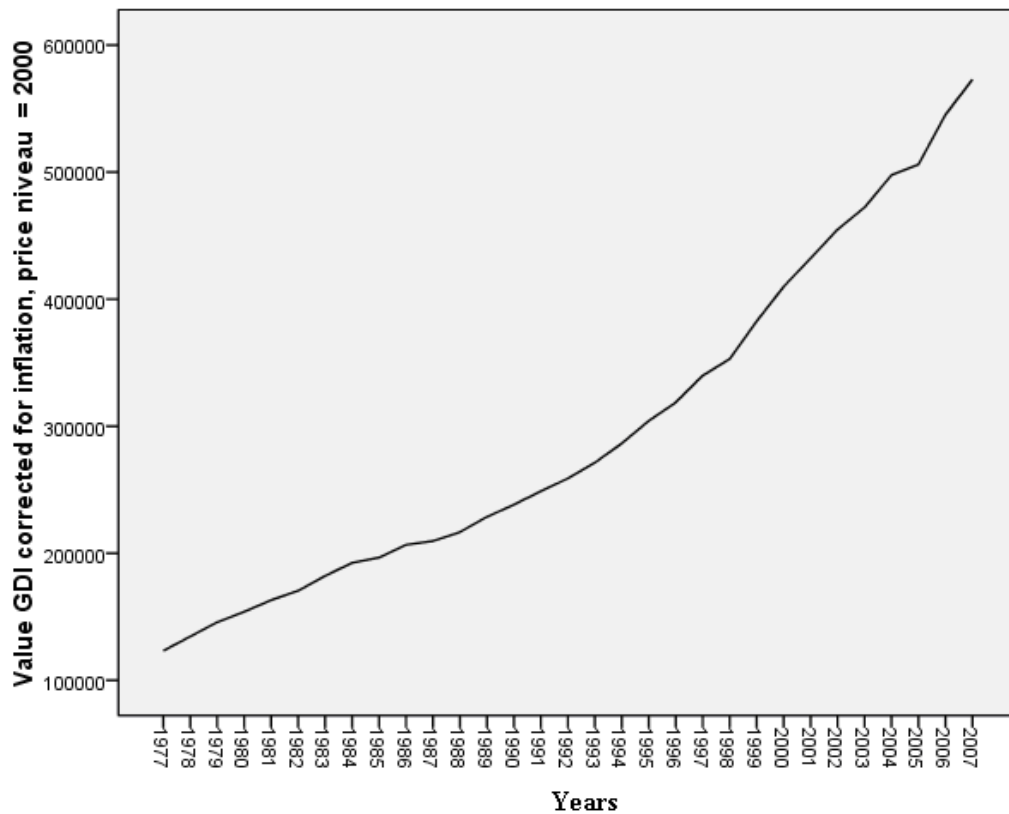
Emigration and return migration divided by educational attainment for The Netherlands in the period from 1977 till 2007.



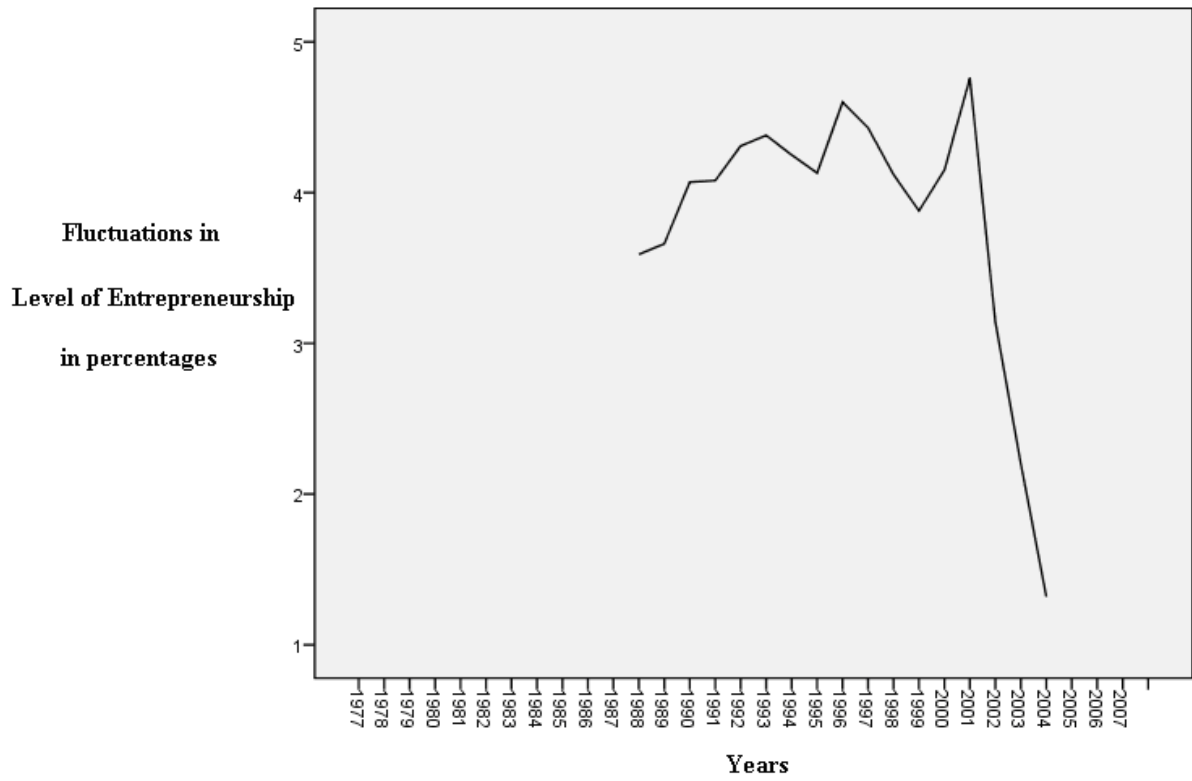
Appendix 2 Economic indicators for The Netherlands 1977 till 2007

Descriptive statistics	Values			
	Minimum	Maximum	Sum	Mean
<i>GDI corrected for inflation (in mln of euro)</i>	231.967	495.765	10.368.756	334.476
<i>Level of Entrepreneurship (firm stock)</i>	434.667	822.767	11.191.006	621.723
<i>Number of firm establishments</i>	32.600	74.900	958.400	53.244
<i>Number of firm liquidations</i>	10.700	35.000	408.400	22.689
<i>Fluctuations of Level of Entrepreneurship</i>	1	5	65	4
<i>Life expectancy</i>	75	80	2.317	77
<i>Fertility rate</i>	11	13	385	12
<i>Government consumption corrected for inflation (in mln of euro)</i>	24.374	48.184	1.170.946	36.592

Gross domestic income corrected for price fluctuations for the Netherlands in the period from 1977 till 2007.



Fluctuations in the Level of Entrepreneurship for The Netherlands in the period from 1988 till 2005



Appendix 3 Autocorrelation tests for the differenced variables

The differences variables of GDI, Life Expectancy, Fertility rate, and Government consumption are non autocorrelated without a time lag. The Native High Skilled Emigration Stock is non autocorrelated after 4 time lags, and the level of entrepreneurship after 1 time lag

Autocorrelations							
Time lags	GDI	Native HS emigration stock	Level of Entrepreneurship	Life expectancy	Fertility rate	Government cons.	
1	0,211	0,828	0,575	-0,252	0,306	0,034	
2	0,239	0,627	0,161	-0,037	0,066	-0,135	
3	0,048	0,513	-0,084	0,206	-0,188	-0,151	
4	0,006	0,418	0,001	0,118	-0,061	0,075	
5	0,083	0,262	-0,037	-0,164	-0,202	-0,145	
6	0,053	0,155	-0,179	-0,160	0,035	-0,158	
7	0,203	0,119	-0,258	0,332	-0,177	-0,162	
8	-0,071	0,089	-0,276	-0,185	-0,075	0,192	
9	0,102	0,055	-0,214	0,009	-0,038	-0,125	
10	0,091	0,037	-0,220	0,090	0,213	-0,182	
11	0,130	0,024	-0,206	-0,128	0,041	0,058	
12	-0,050	-0,060	-0,179	-0,034	0,201	0,181	
13	-0,063	-0,134	-0,070	-0,093	0,160	0,125	
14	-0,237	-0,161	0,125	0,011	0,086	-0,051	
15	-0,131	-0,188	0,206	-0,045	-0,257	-0,059	
16	-0,103	-0,215	N/A	-0,086	-0,178	0,106	

Note: The value in grey indicates from which time lag on the autocorrelation disappears, variables without a grey value are non autocorrelated without time lag.