The effect of trade on migration to the Netherlands

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Abstract

The link between trade and migration is the subject of many theoretical and empirical articles. This study investigates if the bilateral trade flows between various countries and the Netherlands have a significant effect on the migration rate. A fixed effect model is used including both year and country fixed effects to empirically relate trade to the migration rate. The data is obtained for 181 partner countries of the Netherlands for the period 1998 to 2010. The conclusion is that bilateral trade between a specific country and the Netherlands has a significant and positive effect on the migration rate of that specific country to the Netherlands. The result suggests that trade and migration are complements. That would indicate that trade is an additional migration determinant for the Netherlands. This implies that a restrictive trade policy for controlling migration can be designed for certain countries. Imports and exports between a country and the Netherlands seem not to have an individual significant effect on the migration rate.

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1. Introduction

Since the sixties, the Netherlands have become more and more an immigration country. Due to economic growth, a new flow of immigrants[1] came to the Netherlands: guest workers (Zorlu et al, 2001; Obdeijn et al. 2008). With the arrival of immigrants, several problems arose for the government. Which policies are needed to attract certain immigrants and in the same time keep inflows under control? How can the Netherlands create a good working multi-cultural society? Migration and integration is regularly at the centre of the public debate.

The implemented migration policy becomes more and more restrictive over the years. In the nineties, this led to a decline in the inflow of Moroccan, Turkish and Surinamese migrants. However, the overall immigration flow has not decreased.

A considerable amount of literature is about migration determinants and what incentivizes people to move to another country. When migrating, a cost-benefit analysis can be performed. The migration benefits must outweigh the costs (Mahinchai, 2010). Migration costs are direct, forgone earnings and psychic costs incurred when migrating to another country (Borjas, 1999). Networks of migrants from the origin country[2], which already are living in the destination country, can reduce the costs and risks for migrating (Bauer et al, 1999; Massey et al, 1993; Hatton et al, 2002).

Migration determinants can be divided in push and pull factors. Push factors are factors, which are unfavourable in the origin country that gives people an incentive to move away. Pull factors are aspects that attracts one to a destination country (Lee, 1966; Mayda, 2005; Aguiar et al, 2007; de Haan, 1999). This thesis will focus on the push factors, since the focus is on migration to the Netherlands and pull factors cannot be identified.

The focus of this thesis lies on trade as possible migration determinant. The two main arguments to link trade with migration are as followed. First, trade causes a gap between the demand and supply of labour between countries (Aguiar et al, 2007; Mansoor et al, 2006; Massey et al, 1993). This gap results in higher wage level or new job opportunities. More and

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[1] A person is considered an immigrant if he or she settles from abroad in the Netherlands. One has to be registered in the district population registers. This is the case when it is expected that he or she will remain in the Netherlands for at least four months (CBS).

[2] Throughout the research, the origin country of the immigrant is the country of birth of the immigrant or the parents (CBS).

of higher quality jobs incentivizes people to migrate. The wage differential between countries will be captured with the variable GDP per capita.

The second argument to link trade with migration is that trade establishes more cooperation between countries, which results in more knowledge about the countries (Aguiar et al, 2007; Bauer et al, 1999). More knowledge about a destination country is easier to gather, which leads to a decrease in the migration costs. This incentivizes people to migrate from one country to another.

The following questions arise. Does an increase in bilateral trade flows between the Netherlands and a specific country, result in an increase in the migration rate from this country to the Netherlands? Is a restrictive immigration policy the only solution, to control immigration flows or is a trade policy, focused on certain countries, also a possible option? The first step, before implementing a restrictive trade policy for controlling migration, is to investigate if there is a relationship between trade and immigration for the Dutch case.

The central objective for this thesis is to empirically relate bilateral trade flows of the Netherlands with the migration rate from the partner country.

The hypothesis for the study is that an increase of trade leads to an increase of the migration rate. Trade and migration are assumed complements if more trade leads to more (labour) migration between the countries (Aguiar et al, 2007). The expectation is that trade is complementary for the migration rate to the Netherlands. Consequently trade can be seen as an additional migration determinant for the Dutch government.

The empirical analysis relies on a dataset that includes the bilateral trade flows and the migration rate for 181 countries for the years 1998 to 2010. Panel estimation techniques are used for the empirical analysis. A fixed effect model, including both year and country fixed effects, is used to estimate the benchmark equation. The empirical specification is partly based on articles of Mayda (2005), Bauer et al (1999) and Aguiar et al (2007).

The benchmark model shows that bilateral trade flows have a significant and positive effect on the migration rate. This indicates that trade between the Netherlands and a specific country and migration from that specific country to the Netherlands are complements.

To check the robustness of the estimations, several extra variables are included in the benchmark specification. The main findings of the effect of trade on the migration rate remain the same. The difference between high-income and low-income countries is investigated. The estimation shows that trade has a significant impact on the migration rate for the low-income countries only. For both groups, the effect of trade on the migration rate is positive.

In addition, the data is split between the continents. Trade is only significant for the continents Africa and Europe. Trade has a positive effect on the migration rate for countries from Europe. However, the estimation suggests that trade with Africa influences migration from Africa to the Netherlands negatively. This indicates that trade and migration are substitutes for African countries.

Imports and exports by themselves do not have a significant effect on the migration rate in the Netherlands.

The main contribution of this thesis is to show that an increase in trade with a specific country attracts migrants from that specific country to the Netherlands. This paper contributes to the literature in two ways.

The effect of migration on international trade is discussed in various articles, both theoretical as empirical. Also the question whether trade and migration are complements or supplements is a well-discussed subject (Girma et al, 2002; Head et al, 1998; Collins et al, 1997; Bauer et al 1999; Mansoor et al, 2006; Massey et al, 1993; Felbermayr et al, 2012; Aguaiar et al, 2007; Mundell, 1957; Markusen, 1983). However, there is little research using panel data to prove the effect of trade on migration empirically.

The second contribution to the literature is that the result of this research will be of interest to Dutch policy makers and similar countries in the European Union, where increasing migration rates are a well discussed within politics. In addition, the result might be interesting for countries where more people come into the country, than leave the country. Trade policy might be a possible option to stop the outward flow of migration.

The rest of the thesis is organized as followed. In chapter 2, some descriptive statistics will be discussed on immigration trends, migration policy and trade in the Netherlands. Chapter 3 describes several migration determinants. In chapter 4, the link between trade and migration, both theoretical as empirical, is discussed. Chapter 5 outlines the data sets used in the empirical part. The methodology is presented in chapter 6. A presentation of the results is

given in chapter 7. The discussion is included in this chapter. The last section provides a summary of this thesis and the conclusion.

2. Descriptive statistics on immigration trends, policy and trade in the Netherlands

In the following section, the immigration trends, including the main migration motives for migrants, for the Netherlands are discussed. Second, an overview is given of the main changes of the migration policy that are relevant for this thesis. To conclude this chapter, trade trends for the Netherlands are presented.

2.1. Immigration trends in the Netherlands

In the early sixties of the last century, a switch was noticeable for the Netherlands, from an emigration to an immigration country. More people came into the country, than left the country. This was due to the economic growth, which sparked a new immigration flow and reduced the emigration flow to, for example Australia, Canada and New Zealand, at the same time (Zorlu et al, 2001). In this period, three main groups of migrants can be distinguished: the so-called guest workers (persons who were recruited for unskilled jobs), immigrants originated from the (former) colonies, and refugees (Obdeijn et al. 2008; Zorlu et al, 2001).

The overall migration inflow has not decreased[3] over the years relevant for this thesis. In 2008, 10 percent of the Dutch population was first generation migrants (Obdeijn et al, 2008).[4]

The Dutch government defines several main migration motives for the Netherlands. These official motives are labour migration, asylum, family migration (reunification or formation), for study and small factors, such as au pair, internship or medical treatment (CBS; Nicolaas et al, 2001).

In Figure 1, the trends of different migration motives are displayed. The effect of the policy changes can be observed in the figure. For instance, the Netherlands Immigration Law of 2000 had a clear negative effect on the number of asylum seekers. The policy changes will be discussed in more detail in the following section.

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[3] Figure 3 in the Appendix shows the immigration trend for the Netherlands for the period 1995-2011.

[4] Migrants who are born abroad, belongs to the first generation of immigrants (CBS).

Figure 1: Immigration numbers for the Netherlands, by migration motives for the period 1995-2011[5]

Immigration numbers for the Netherlands, by migration motives for the period 1995-2011

Legend:
— Motive: labor
— Motive: asylum
— Motive: family migration
— Motive: study
— Motive: au pair/internship
— Other motives
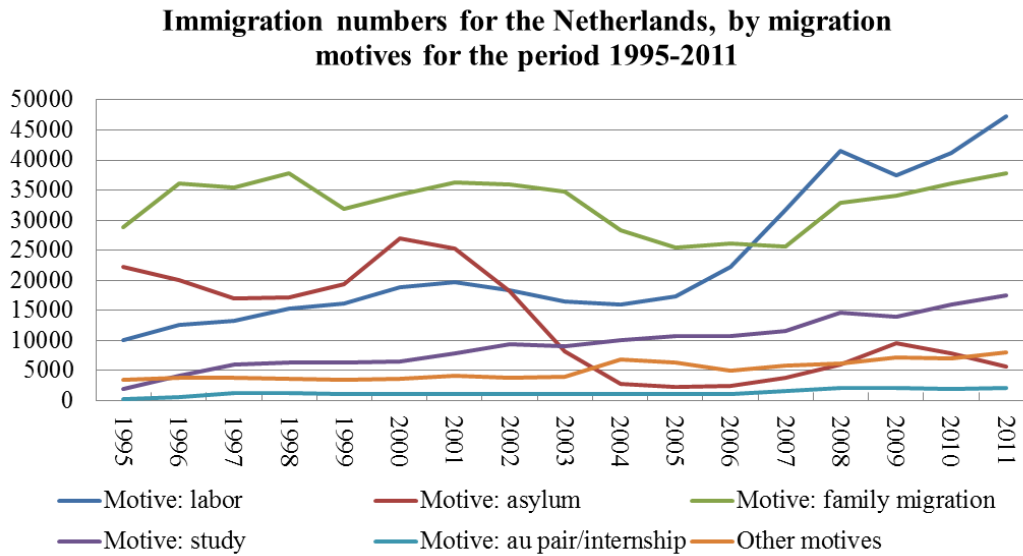
Source: website statline.cbs.nl

2.2. Changes in migration policy in the Netherlands

In the nineties and the beginning of the 21th century, several changes were made in the migration policy in the Netherlands. Some changes are specifically targeted at a specific group of migrants and some changes are more general. The important policy changes concerning the scope of this research are discussed in this section.

In 1994, the "Nieuwe Vreemdelingenwet" (New Immigration Law) came into force (Bonjour, 2009; Obdeijn et al, 2008). A new status went into effect, called the "Voorwaardelijke Vergunning tot Verblijf" (conditional license to stay). The purpose of the New Immigration Law was to reduce the number of migrants by shortening the duration of the procedures concerning admission and expulsion. The goal of the law of 1994 was not achieved. This led to a new law in 2010. This new law will be discussed in more detail later on.

In 1995, the former law for labour migration[6] was restricted by introducing a new law

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[5] In the official numbers of CBS, the illegal immigrants are missing. There are between 112.000 and 163.000 illegals living in the Netherlands (Engbersen et al, 2002).

[6] "Wet Arbeid Buitenlandse Werknemers" (Foreign Workers Employment Act) went active in 1979. In this law, there was explicitly stated the preference of workers from the Netherlands and EU countries (Obdeijn et al, 2008).

called "Wet Arbeid Vreemdelingen" (Foreign Nationals Employment Act). The purpose was to minimize the inflow of low-skilled workers where possible (Obdeijn et al, 2008).

The new "Nederlandse Vreemdelingenwet" (Netherlands Immigration Law) went active in November 2000. The reasoning behind introducing this new law was that the goals of the New Immigration Law of 1994 were not achieved. Two different procedures were set up to obtain a residence permit. One procedure was intended for refugee asylums and one "regular" procedure for people who want to come to the Netherlands for work, study or family reunification or formation (Obdeijn et al, 2008). The law intended and succeeded for clearer requirements for admission and shorter procedures (W.R.R., 2001; OECD, 2011). One of the aims was to decrease the number of asylum seekers. Immediately, there was a sharp decline noticeable in the numbers.

To target highly skilled foreigners, which are able to contribute to the Dutch knowledge economy, the "Kennismigrantenregeling" (Skilled Migrants regulation) was introduced in 2004 (Jennissen et al, 2014). Migrants who fit the criteria of the regulation can migrate easier and quicker to the Netherlands. The government reviewed the regulation after two years and is positive about how the regulation functioned (SER, 2007).

In the year 2007, the Dutch labour market opened for persons from Central and Eastern European member states which joined the European Union in 2004 (Jennissen et al, 2014). This resulted in more labour migrants coming to Netherlands. In 2009, most of the immigrants came from Poland and Germany (OECD, 2011).

2.3. Dutch trade trends

The Netherlands has a rich trading history. In the 17th century, the Netherlands experienced an explosive economic growth. The so-called Golden age is known for the trade expeditions of the Dutch East India Company (VOC) and thriving merchant capitalism. The 18th century was less successful compared to the Golden Age (de Vries et al, 1997). Due to the industrial revolution in the 19th century, the economy picked up again.

Throughout this research, imports will indicate goods shipped from another country to the Netherlands and exports are goods shipped from the Netherlands to another country, unless explicitly stated otherwise. How the imports and exports fluctuate over the years 1996-2012 in the Netherlands, is visualized in Figure 2. An increase in the level of both imports and exports can be observed, with a dip in the years when the global economic crisis hit the Netherlands. Over all the years, the exports outweigh the imports.

Figure 2: Imports and exports of the Netherlands for the period 1996-2012

Imports and exports of the Netherlands for the period 1996-2012
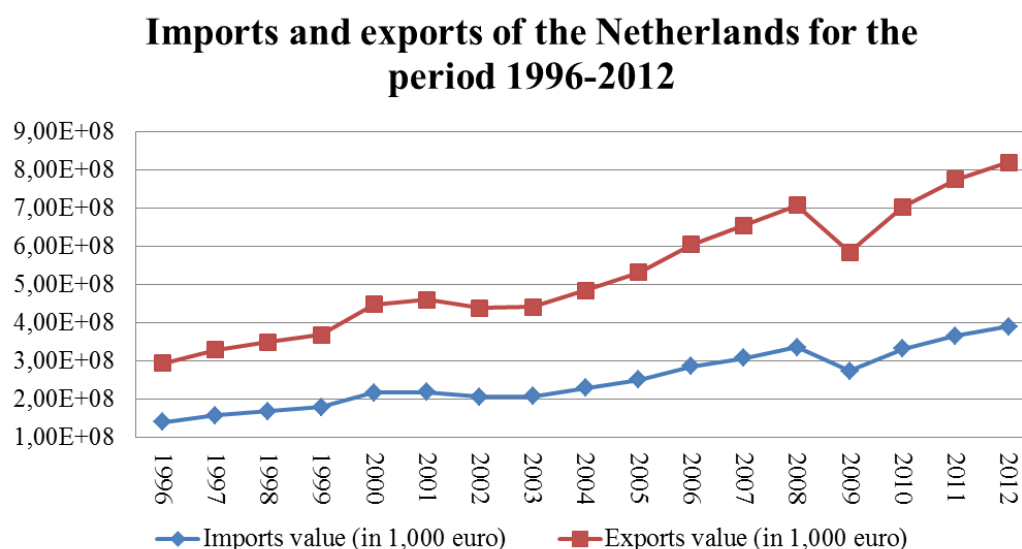
Source: website statline.cbs.nl

3. Migration determinants

Various papers discuss general economic and demographic migration determinants that drive world migration. The decision to migrate to another country depends on several factors.

One of the determinants, Hatton et al (2002) discusses, is the wage differential between the origin and the destination country. However, migration is driven mostly by the expected rather than the actual wage differences (Mansoor et al, 2006). When a country has a lot of poverty, this results in a growing emigration flow. People migrate to another country where the economic situation is assumed to be better. Risk-averse people are less likely to take this step (Hatton et al, 2002). When the wages in the origin and destination country differ no more than the migrations costs, the migration flow stops (Bauer et al, 1999).

When a country has a rise in income, this reduces the emigration flow. Hatton et al (2002) conclude that for a West-European country, such as the Netherlands, a 10 percent rise in GDP per capita reduced migration to the United States by 12.6 percent in the period 1971-1998.

The skill-level of the migrant plays a significant role in the decision to migrate (Hatton et al, 2002). If the return to skills is greater in the destination country than the origin country, the immigration flow from the country of origin to the destination country will increase.

Another factor that influences migration positively is the population of a country. A large population, in a small economy for instance, results in more competition for each

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individual. This motivates individuals to migrate, in order to look for better opportunities abroad (Aguaiar et al, 2007).

The presence of immigration policy in the destination country can restrict immigration (Hatton et al, 2002). There can be two types of restrictive immigration policy: quotas that restrict numbers (in total or by specific country) or policies that select immigrants according to certain characteristics (with or without a limit on the numbers of immigrants) (Hatton et al, 2002). Restrictive policies result into higher costs for migrating.

According to the neoclassical model, an individual is assumed to maximize his or her utility function.[7] This cost-benefit analysis is assumed to drive migration (Mahinchai, 2010; Aguiar et al, 2007). An individual decides to migrate if the benefits of migrating outweigh the costs. To succeed on the labour market, factors, such as age, education and skill-level play an important role in the cost-benefit analysis. The level of education and the propensity to migrate are positively related (Mahinchai, 2010). The net expected returns on migrating are higher for young adults then for older people. Due to higher life expectancy, benefits from migrating will be higher (Mahinchai, 2010; Mansoor et al, 2006).

Migration costs are direct, forgone earnings and psychic costs incurred, when migrating to another country (Borjas, 1999). Networks can reduce the costs and risks for migrating through social interactions and information about the destination country (Bauer et al, 1999; Massey at al, 1993). Networks are the stock of migrants from an origin country already living in the destination country (Hatton et al, 2002).

There are several country-specific characteristics that influence migration cost, such as: whether there is a common border, if there are colonial ties, possible common language and the distance between the countries (Ravenstein, 1885; Belot et al, 2012; Mayda, 2005). A common language makes integrating easier, which lowers the migration costs.

One of Ravenstein's laws of migration (1885) states: migration costs decreases as the distance increases. The further apart the two countries are from each other, the higher the traveling costs, for the actual move as well as for visits back home (Mayda, 2005). Countries that are closer to a destination country are more likely to have greater knowledge about the

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[7] See the articles of Bauer et al (1999), Mahinchai (2010), Mansoor et al (2006), Massey et al (1993), Felbermayr et al (2012), Aguaiar et al (2007)

destination country. The migration decision to come to a destination country close by is more likely than a destination country at the other end of the world.

The different migration determinants can be divided in push and pull factors. Push factors are factors that are unfavourable in the country of origin, which give people an incentive to move away. Pull factors are aspects that attracts a person to a destination country (Lee, 1966; Mayda, 2005; Aguiar et al, 2007; de Haan, 1999). Table 1 illustrates several economic and demographic, political and social and cultural factors mentioned in the literature.

Table 1: Overview push and pull factors

	Push factors	Pull factors
Economic and demographic	- Life expectancy - Poverty - Unemployment or low wages - Lack of basic health and education	- Potential for improved standard of living - Prospects of higher wages - Personal or professional development
Political	- Conflict and/or violence - Poor governance - Corruption - Human rights abuses	- Safety and security - Individual freedom - Political freedom
Social and cultural	- Social norms that requires to migrate - Discrimination based on gender, ethnicity, religion, and the like	- Family reunification - Ethnic homeland - Freedom from discrimination

Source: articles by Mahinchai (2010), Mansoor et al (2006), Hatton et al (2002), Lee (1966) and Mayda (2005).

4. Trade as determinant for migration

Most research about migration and trade investigated the impact of migration on bilateral trade flows (Girma et al, 2002; Head et al, 1998; Collins et al, 1997). This thesis focuses on the question if trade is an additional determinant for migration. In this chapter a theoretical analysis is given to relate trade to migration. A short overview of the discussion is given on the question whether migration and trade are substitutes or complements. To finish, some empirical studies on the cohesion of trade and migration will be discussed.

4.1. Theoretical Analysis

The link of trade with migration is twofold. First, trade causes a gap between the demand and supply of labour between countries. This gap results in higher wage level or new job

opportunities. More and of higher quality jobs incentivizes people to migrate. Second, trade establishes more cooperation between countries. This results in more knowledge about the two countries. More knowledge about a potential destination country makes it more likely to be the final destination country when migrating.

The first line of reasoning is based on the international difference in the demand and supply of labour (Aguiar et al, 2007; Mansoor et al, 2006; Massey et al, 1993).

Countries, with more labour intensive productions, demand more labour when countries are trading. Countries with more capital-based economics have a surplus in the labour supply. The gap between demand and supply for labour can result into migration from countries with surplus of labour to countries with a shortness of labour force (Aguiar et al, 2007). If country A increases the exports of goods to country B, the demand for labour increases in country A. Meanwhile the supply for labour in country A does not change by increased trading of products. The result of the gap between demand and supply of labour is twofold, higher wage levels and new job opportunities in country A (Hering et al, 2014). This pulls migrants from country B to country A. When there are more jobs available, the probability for employment is higher. People migrate to a country where they believe are better work possibilities. The wage level of a country will be captured in the GDP per capita variable. Trade in the benchmark model will capture the direct effect of trade on the migration rate and not the indirect effect of trade trough wage differences between countries.

The second line of reasoning in how trade affects migration is that due to trade more cooperation between the countries is established (Aguiar et al, 2007; Bauer et al, 1999). Demand rises for specific workers originating from the origin country to maintain the trade relationship between the origin and destination country. As well, knowledge about a destination country is more easily gathered. This leads to a decrease in the migration costs. Lower migration costs give people an incentive to migrate from one country to another.

From the prospective of a migrant, exports from his or her country to the Netherlands influences migration as followed. A person from the origin country produces products, which are shipped out of the country to the Netherlands. The common opinion may rise, that in the Netherlands more money is available. This may result into migration to the Netherlands for a better life with higher living standards than in the country of origin.

Imports from the Netherlands to his or her country have a similar reasoning as exports. People consume products created in the Netherlands. The common opinion may rise, that there are more employment opportunities in the Netherlands. Therefore, migrating to the Netherlands is an option for a better life with higher living standards.

4.2. Trade and migration: Complements or substitutes?

The question discussed in various papers is whether trade and migration are complements or substitutes.[8] Trade and migration are substitutes if there is a negative relationship between the two factors, trade and migration (Aguiar et al, 2007). This is when more trade reduces (labour) migration. The contrast may hold also: more migration could reduce trade. Instead of trading the good from one country to another, consumers may move to the market where the good is produced.

A positive relationship between migration and trade means that the relationship is complementary; more trade leads to more migration between the countries (Aguiar et al, 2007). With increasing trade, migration might strengthen the trade links between countries.

Most articles, on the question whether trade and migration are substitutes or complements, are based on the article of Mundell (1957) or the article of Markusen (1983).

In the article of Robert Mundell (1957), a classical theory is given for connecting international trade with international migration.   He developed a two-country two-commodity two-factor model. Under several assumptions, international trade can serve as a perfect substitute for factor movement, migration.

He states that: '*commodity-price equalization is sufficient to ensure factor price equalization and factor price equalization is sufficient to ensure commodity-price equalization*' (Mundell, 1957). The two main assumptions are that the production functions are homogeneous and identical in both countries and there is asymmetry in the relative endowments between countries.

The article of Markusen (1983) relaxes a number of Mundell's assumptions. The main changes are that one of the two countries has superior technology for the production of one of

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[8] See articles of Mundell (1957), Markusen (1983), Candau (2003), Bruder (2004), Egger et al (2011), Genc (2011), Bauer et al (1999) and Aguiar et al (2007)

the goods and identical relative factor endowments across countries. He concludes that the relationship of international trade and migration are not substitutes, but complements.

In some articles, there is a difference assumed between the short run and long run for the question whether migration and trade are substitutes or complements (Taylor, 2006; Hollifield, 2006; Bruder, 2004). In the short run, empirical studies suggest that trade and migration are complements. This is especially the case if the gap between wages and incomes is very high between the two countries (Hollifield, 2006). In contrast, through factor price equalization trade and migration are assumed substitutes in the long run (Taylor, 2006; Hollifield, 2006).

To conclude this part, there is no agreement at a theoretical level whether trade and migration are substitutes or complements. The assumptions made seem to drive the results. In this thesis short run effects are examined. The hypothesis is therefore that trade is complementary for migration to the Netherlands.

4.3. Empirical Literature

In the following section, relevant empirical studies are outlined. A common model used for linking migration and trade is the gravity model of trade, in which trade between pairs of countries is related to measures of their respective preferences, sizes, and trade costs (Bruder, 2004; Felbermayr et al, 2012; Genc et al, 2011). In the gravity trade model, the immigration rate is included as independent variable. In contrast, the migration rate is the dependent variable in this thesis.

In the article of Collins et al (1997), trade and factor movement between several countries are analysed for the period 1870-1940. They use panel data split up in fifteen- to twenty-years periods to describe the economic link between factor movement (capital and labour) and trade.

Collins, O'Rourke and Williamson use a trade variable and a policy variable as two separate dependent variables. The authors found that trade and capital flows were rarely substitutes and often complements for several countries. Trade and migration were never substitutes. The authors assume that there is a weak complementary link found between trade and migration flows.

In addition, Collins, O'Rourke and Williamson take a closer look at immigration policy. The authors notice that policy makers most likely did not view trade and immigration as substitutes. Otherwise, policy makers would have restricted or unrestricted both trade and migration at the same time.

Aguiar, Walmsley and Abrevaya (2007) use a gravity equation to test the effect of bilateral trade on a subset of international permanent legal migration from 175 countries into the United States for the period 1996 to 2005. They found that trade has a positive effect on migration, which indicates the two factors are complementary. The conclusion is that bilateral trade flows do not significantly explain migration flows.

Bruder (2004) studies trade and labour migration between Germany and its main source countries for foreign workforce for the years 1970 to 1998. The main conclusion of this article is that there is a substantial link between trade and (labour) migration. Two types of questions are studied. First, the impact of labour migration (both immigration as emigration) on trade (both imports as exports) is examined. A gravity trade model is used to estimate the effect. No significant effect of migration on trade is found. Second question is whether that is an impact of trade on labour migration. The conclusion is that, when the trade volume increases, there is a negative and significant effect on labour migration.

5. Data

This chapter provides information on the sources of the data, which will be used for testing the impact of trade on the migration rate.

The first dataset is from the Dutch Central Bureau of Statistics (CBS). The dataset is published on the website Statline.nl. It contains data of the official migration inflows, broken down by country. In total, immigration flows from 237 countries to the Netherlands for the years 1996 to 2012 are derived. Here, immigration is defined as settling of persons from abroad in the Netherlands. The requirement is that people have to be registered at a local population register when he or she is at least four months in the Netherlands.

Four sets of countries are excluded from the CBS dataset. Three sets are countries belonging to former Yugoslavia, Soviet Union and Czechoslovakia. These countries have split

in the last few decades. A person is labelled to the country, in which he or she is born.[9] The countries Yugoslavia, Soviet Union and Czechoslovakia do no longer exist and it is not possible to match their citizens to the newer countries. For that reason, these countries are excluded. The last set is Netherlands Antilles and Aruba. Aruba, Curacao and Saint Maarten became separate countries, during the sample period for this thesis. Bonaire, Saint Eustatius and Saba, also known as the Caribbean Netherlands, operate as special cities of the Netherlands. It is not possible to match their citizens to a specific newer country. For that reason, these countries are also excluded from the dataset.

The second dataset is from the World Bank and contains the World Development Indicators. Variables such as GDP, population and unemployment rates for various countries are included in this dataset. To calculate the migration rate, the migration inflows to the Netherlands of a country (derived from the CBS dataset) are divided by the total population of that same country (derived from the WDI dataset).

The third dataset is from the International Monetary Fund (IMF). It contains imports and exports statistics between 187 countries. Only the statistics of the Netherlands as either importing country or exporting country are used. Trade is calculated using this data. The openness index is the sum of the imports and exports between a specific country and the Netherlands, divided by the GDP of that country.

The fourth dataset contains geographical variables. This set originates from the CEPII.[10] It contains variables that represent country characteristics, such as a dummy for a common border between countries and a variable for the distance of a country to the Netherlands. These variables are time invariant and will be used only for the first two regressions.

After merging the four datasets, the final dataset contains 181 countries. The data of the final set covers the years 1998 to 2010. Appendix A contains the data overview. Table A-1 presents the mean of migration inflows of the 181 countries over the time. Table A-2 gives an overview of the dependent and all the independent variables, which are being used in the regressions. These variables are chosen based on the theoretical research in chapter 3 and 4. Table A-3 provides the mean, minimum, maximum, and standard deviation for all variables. The dependent variables are lagged one year in relation to the migration rate to avoid reverse

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[9] Persons born in Riga (capital of Latvia) before 1991 are registered under the country Soviet Union. Persons born in Riga after 1991 have Latvia as country of origin.

[10] CEPII stands for: Centre d'Etudes Prospectives et d'Informations Internationales.

causality. Table A-4 shows the correlation between the variables of the benchmark equation. The correlation between migration rate and trade is 0.5977. This indicates a possible relationship between the two variables. As expected, the correlations between the trade, imports, exports and GDP variables are large.

6. Methodology

This chapter provides information on the methodology for testing the impact of trade on the migration rate. The central objective of this thesis is to empirically relate bilateral trade flows to immigrant flows to the Netherlands. A fixed effect model is estimated.[11] The benchmark specification looks as followed:

$$
\begin{aligned}
\ln migration\ rate_{i,t} \\
= \beta_0 + \beta_1 \ln trade_{i,t-1} + \beta_2 \ln GDPpcap_{i,t-1} + \beta_3 popgrow_{i,t-1} \\
+ \beta_4 lifeexp_{i,t-1} + \beta_5 unemp_{i,t-1} + t_t + a_i \quad\quad (1)
\end{aligned}
$$

The index i represents the country of origin and the index t denotes the time. $migration\ rate_{i,t}$ is the inflow of migrants of country i to the Netherlands divided by the total population of country i in year t. $trade_{i,t-1}$ is measured as the openness index. This is the sum of the imports and exports between country i and the Netherlands, divided by the GDP of country i. $GDPpcap_{i,t-1}$ is the GDP per capita of country i in year $t-1$. $popgrow_{i,t-1}$ is the annual population growth. $lifeexp_{i,t-1}$ is the life expectancy in years. $unemp_{i,t-1}$ is the unemployment rate as percentage of the total labour force.

All the independent variables are in natural logarithms (abbreviated as ln from hereon), except population growth and life expectancy. The advantage of taking ln is that the outliers are filtered out. Also, all independent variables are lagged one year.

To control for time shocks for all countries, year fixed effects, t_t, are used.[12] Country fixed effects, a_i, are included to control for unobserved country-specific effects, which are

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[11] A Hausman test is performed to confirm the choice for a fixed effect model over a random effect model. See appendix B-1

[12] A test is performed with the null hypothesis that the coefficients for all years are jointly equal to zero. The reasoning behind this is to see if year fixed effect are needed. See appendix B-2

time-invariant. The year and country dummies capture the variation between countries and the variation between the years within one specific country.

With panel data, the error terms of country i are likely to be correlated over time, resulting in serial correlation.[13] To solve serial correlation and prevent heteroskedasticity, robust standard errors, clustered at the country level, will be used in all the estimations.

If the sign of the trade variable is positive, the relationship between trade with respect to immigration flows is assumed complementary. If the sign is negative, this indicates that the variables are substitutes.

The independent variables included in the equation, in addition to trade, are so-called push factors. These factors give people an incentive to move away. Variables representing the pull factors are not included in the equation, since the focus of this thesis is on migration to the Netherlands and pull factors cannot be identified.

GDP per capita of a country is an indicator for wages in that country. Migration is driven mostly by the expected rather than the actual wage differences (Mansoor et al, 2006). The expectation is that when the GDP per capita rises in a country, the expected GDP per capita in the Netherlands might be increasing and higher than in that country. Therefore, the choice to migrate to the Netherlands might be made.

Population growth and life expectancy are correlated with the migration rate. These two variables are taken into account in several articles (Mahinchai, 2010; Egger et al, 2011; Hatton et al, 2002; Mansoor et al, 2006; Aguaiar, 2007). If a population grows in a country, the labour market becomes more crowded. Therefore, people may emigrate. If the life expectancy in a country is high, the net expected returns are assumed higher. This can be a factor when a person makes the decision to migrate. If the life expectancy is low, a person may have only a few more years to live after migrating. Therefore, the costs of migrating are probably higher than the benefits. The expectation is: if the population grows and the life expectancy rises, this affects the migration rate positively.

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[13] A Wooldridge test is performed with the null hypothesis that there is no first order serial correlation. See appendix B-3.

Unemployment is often mentioned in the literature as another pull factor (Mayda, 2005; Bruder, 2004; de Haas, 2011; Hatton et al, 2002). Increasing unemployment in a country is expected to lead to an increase of the migration rate towards the Netherlands.

To investigate, whether there is a different effect of imports and exports, instead of the trade, a second benchmark specification will be estimated separately:

$$\ln migration\ rate_{i,t}$$
$$= \beta_0 + \beta_1 \ln imports_{i,t-1} + \beta_2 \ln exports_{i,t-1} + \beta_3 \ln GDPpcap_{i,t-1}$$
$$+ \beta_4 popgrow_{i,t-1} + \beta_5 lifeexp_{i,t-1} + \beta_6 unemp_{i,t-1} + a_i + t_t \qquad (2)$$

$imports_{i,t-1}$ is the volume of imports to the Netherlands originating from country i. $exports_{i,t-1}$ is the volume of goods shipped from the Netherlands to country i. The expectation is that an increase of imports or exports leads to an increase in the migration rate.

Another dimension that will be introduced is the difference between the continents. The benchmark model, equation (1), will be estimated separately for the continents. Due to very low observations, the countries of Oceania are included in the group of the countries of South America. Most continents have a low number of observations. Therefore, the results have to be interpreted with caution.

The expectation is that the effect of the trade variable for Africa will be non-significant and negative. In formulae: $\beta_{1,Africa} < 0$. Africa has a lot of countries that are poor and have little to none trading interaction with the Netherlands. The inhabitants of poor countries might be too poor to migrate. However, when there is more traded more welfare and job security is realized in the poor country through trade relationships. This results in a decrease of the emigration rate to the Netherlands.

The expectation is that trade affects migration mostly in Europe. Due to trade, the knowledge about the Netherlands is easier to gather, which leads to a decrease in the migration costs. Trade is more efficient with these countries, due to lower shipping costs and regulations within the European Union. Migration policy in the Netherlands is also more flexible for migrants from European countries (Obdeijn et al, 2008). Following from these factors, the migration decision to come the Netherlands is easier to make. The expectation is

that the coefficient of trade $\beta_{1,Europe}$ is positive and higher than the β_1's of the other continents.

The effect of either imports or exports by themselves is estimated to check the robustness. In equation (2), the effect of imports and exports is estimated together. However, it is also interesting to see, whether the variables have an effect on their own. Therefore, the benchmark equation (1) is taken and $trade_{i,t-1}$ is replaced, with either an imports or exports based variable. Various dimensions of imports (exports) variables are taken into account: (1) the variables are the volume of imports (exports) to the Netherlands in US\$, (2) volume of imports (exports) as percentage of GDP and (3) the imports (exports) to the Netherlands as percentage of total imports (exports). The expectation is that if the imports (exports) variable increases, this impacts the migration rate positively.

This study relies on panel estimation techniques. Panel data has several advantages over cross-sectional or time-series datasets (Verbeek, 2008). First, panel data allows for correcting easily time-invariant unobservable effects specific to a country. These effects are correlated with the observable independent variables. Second, panel data gives a larger number of data points, compared to cross-sectional and time-series data. Third, a larger number of observations lead to an increase of degrees of freedom. It reduces collinearity among explanatory variables. These three things together result in an improvement of the efficiency of the econometric estimations, compared to cross-section data (Bauer et al, 1999; Hsiao, 2003).

There are two main issues that can play a role with panel data: heterogeneity bias and selectivity bias (Verbeek, 2008; Hsiao, 2003). One of the main assumptions with panel data is that different observations of the same country are independent. The risk lies in incomplete (unbalanced) data. This could lead to heterogeneity bias. This is not an issue for the dataset that will be used for the estimations. A selectivity bias can occur, when a person is selected for a panel, he or she can change their behaviour dramatically. For this thesis, this is not an issue, because the data is for countries in total and not at an individual level.

7. Results

In this section, the main results of the empirical analysis are displayed, which are based on the methodology discussed in chapter 6. The results can be interpreted as an estimate of the elasticity of trade with respect to the migration rate.

7.1. Estimation of benchmark equations

Table 2 presents the results of the estimation of the benchmark equation (1) and (2), mentioned in the methodology. Empirically is tested whether an increase in bilateral trade flows between a country and the Netherlands, results into a higher migration rate from country i to the Netherlands. All the variables are in ln, except for population growth and life expectancy. Robust standard errors, clustered at the country level, are used for all the estimations.

Table 2: Estimation of benchmark equations

	(1)	(2)	(B1)	(B2)
Dependent variable		ln $migration\ rate_{i,t}$		
ln $trade_{i,t-1}$	0.151***		0.140*	
	(0.0353)		(0.0635)	
ln $imports_{i,t-1}$		0.0169		0.0449
		(0.0341)		(0.0898)
ln $exports_{i,t-1}$		-0.0151		0.0222
		(0.0226)		(0.0404)
ln $GDPpcap_{i,t-1}$	0.367***	0.337***	0.461*	0.359
	(0.0573)	(0.0628)	(0.219)	(0.209)
$popgrow_{i,t-1}$	0.0215	0.0124	0.0254	0.0170
	(0.0264)	(0.0265)	(0.0269)	(0.0271)
$lifeexp_{i,t-1}$	0.00799	0.0104	0.0274	0.0236
	(0.00994)	(0.0104)	(0.0295)	(0.0302)
ln $unemp_{i,t-1}$	0.0578	0.0602	0.0199	0.0220
	(0.0465)	(0.0470)	(0.0950)	(0.0935)
$commonlang_i$	3.297***	3.567***		
	(0.865)	(0.931)		
$wdist_i$	-0.476***	-0.568***		
	(0.115)	(0.127)		
$border_i$	-2.088*	-2.143*		
	(0.839)	(0.906)		
$colony_i$	1.399*	1.526*		
	(0.621)	(0.675)		
Observations	1017	1017	1017	1017
Year FE	Yes	Yes	Yes	Yes
Country FE	No	No	Yes	Yes

Robust standard errors, clustered at the country level, in parentheses.
*, ** and *** represent respectively statistical significance at the 1%, 5% and 10% levels.

The first two equations estimated are the two benchmark specifications but without country fixed effects. Instead of using country fixed effects, a number of time-invariant country-specific variables are included in the estimation. The chosen variables are based on the framework to study migration flows, used in the article of Mayda (2005). The variables are $commonlang_i$ (common language), $wdist_i$ (weighted distance)[14], $border_i$ (common border) and $colony_i$ (former colony).

Trade has a significant and positive effect on the migration rate. This indicates that trade and migration between the Netherlands and the partner country are complements.

The time-invariant variables are all significant and have the expected sign except the common border dummy. Having a common language and post-colonial relationship impacts the migration rate positively. This is in line with the literature (Ravenstein, 1885; Belot et al, 2012; Mayda, 2005).

 The higher the distance is between a country and the Netherlands, the lower the migration rate. However, there seems to be a turning point. The effect of a common border is negative. Ceteris paribus, migration Belgium is less, than the migration from, for example, France. One possible explanation is due to the effect of border regions. People live in one country but the main focus of the household is on the other country. Note that the Netherlands has only two border countries. Therefore, further research with more destination countries is needed to be more conclusive.

The control variables, GDP per capita, population growth, life expectancy and unemployment, have the expected positive effect. GDP per capita is a significant. GDP per capita captures the effect of wage differences between country i and the Netherlands. Wage differences is one of the migration determinants discussed in chapter 3 (Hatton et al, 2002; Mansoor et al, 2006). This positive effect of GDP per capita on migration rate is in line with the expectation. When the GDP per capita rises in a country, the migration rate increases.

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[14] $wdist_i$ is the weighted distance between country i and the Netherlands. "*The basic idea is to calculate the distance between two countries based on bilateral distances between the biggest cities of those two countries, those inter-city distances being weighted by the share of the city in the overall country's population*" (Mayer, 2006)

The second column of Table 2 is the equation with separate imports and exports variables, instead of the trade variable. The effect of imports is positive and the effect of exports is negative, but both coefficients are not significant. The control variables and the time-invariant variables have a similar effect as in the first column.

The time-invariant variables may not capture all unobserved country-specific effects. Therefore, country fixed effect will be included in the benchmark models, next to year fixed effects to control for time shocks.

The third column of Table 2 is the estimation of benchmark equation (1). The impact of trade on the migration rate is positive and significant. This is consistent with the predictions mentioned in the methodology. If there is a rise in trading with a specific country and the Netherlands, the migration rate from that specific country to the Netherlands rises.

As before, the control variables, GDP per capita, population growth, life expectancy and unemployment, have a positive effect on the migration rate. Again, only GDP per capita has a significant effect on the migration rate.

The fourth column of Table 2 is the estimation of equation (2). As expected, both imports and exports have a positive effect on the migration rate. However, the effect is not significant. The control variables have a similar effect as the first three columns. GDP per capita is not significant anymore. All the other variables remain not significant.

7.2. Robustness check

To check the robustness of the estimations, several extra variables are included in the benchmark specification. Estimations are presented in Table 3. However, due to missing data, the number of observations is reduced.

In the first column of Table 3, inflation and a dummy for regional trade agreements are added to the benchmark equation. These variables are assumed to affect both trade and the migration rate. The main finding of the effect of trade on the migration rate remains the same. Trade has a positive and significant effect on the migration rate. The control variables reflect a similar result as the estimation of the benchmark equation.

Inflation has a negative effect on the migration rate. The effect is significant. An increase in the inflation rate in country i, leads to a small decrease in migration rate to the Netherlands.

Table 3: Robustness estimations

Dependent variable	(1)	(2)
	$\ln migration\ rate_{i,t}$	
$\ln trade_{i,t-1}$	0.135**	0.174*
	(0.0637)	(0.0951)
$\ln GDPpcap_{i,t-1}$	0.394**	0.547*
	(0.199)	(0.300)
$popgrow_{i,t-1}$	0.0705	0.127
	(0.0485)	(0.0798)
$lifeexp_{i,t-1}$	0.0225	0.0130
	(0.0308)	(0.0718)
$\ln unemp_{i,t-1}$	0.0217	0.0854
	(0.0919)	(0.122)
$inflation_{i,t-1}$	-0.00127***	-0.00103***
	(0.000204)	(0.000254)
$rta_{i,t-1}$	0.0338	
	(0.105)	
$\ln school\_prim_{i,t-1}$		-0.574
		(0.610)
$\ln school\_sec_{i,t-1}$		-0.222
		(0.362)
$\ln school\_ter_{i,t-1}$		0.0647
		(0.235)
$\ln spend\_edu_{i,t-1}$		
$\ln spend\_hea_{i,t-1}$		
$\ln pop\_dens_{i,t-1}$		
Observations	1010	642
Year FE	Yes	Yes
Country FE	Yes	Yes

Robust standard errors, clustered at country level, in parentheses.
*, ** and *** represent respectively statistical significance at
the 1%, 5% and 10% levels.

Inflation can be a sign that an economy is growing. When an economy grows, the push factors for migrating have less effect. The incentive to leave the country decreases

The coefficient for the trade agreement is positive. It is not significant. The sign of the coefficient is contrary to the expectation. A regional trade agreement is sometimes viewed as

a tool to reduce migration (Aguiar et al, 2007). The theory is that when a country has a trade agreement with the Netherlands, the country has an impulse to trade with the Netherlands, instead of with a country with which they do not have a trade agreement. When more trade is achieved, this tends to equalize the prices across countries. Payments for labour tend to equalize as well (Aguiar et al, 2007). This decreases the incentive to migrate.

In the second column of Table 3, school enrolment variables are introduced for primary, secondary and tertiary school. In addition, inflation is included. A similar result is observed for all variables. The positive impact of trade on migration remains with the low number of observations. The three school enrolment variables are not significant.

7.3. *Estimation of benchmark equation by low- and high-income countries*

To investigate if there is a difference between poor and rich countries when looking at the effect of trade on the migration rate, equation (1) is estimated separately for low- and high-income countries. The difference between a low and a high-income country is defined with a GDP per capita higher or lower than $10,000. The expectation is that trade has a higher impact for the countries with the lowest-incomes. The estimations for low- and high-income countries are presented in Table 4.

For only the low-income countries, trade between a country and the Netherlands has a significant impact on the migration rate. The effect is positive for both groups of countries. However, the number of observations may not be sufficient enough to conclude something definitive.

One possible explanation for the difference in significance is due to a greater effect of trade on the society as a whole for low-income countries than for high-income countries. When a poor country mainly trades with the Netherlands, the country has more information about the Netherlands than about other possible destination countries where they have fewer trading relationships with. When trade increases, more knowledge about the Netherlands becomes available. When there is more knowledge about a destination country, the choice to migrate to a specific destination country is easier to make. In contrast, trade with a rich country may be greater, but less intensive with the Netherlands. The economy of a rich country depends less on trade with the Netherlands specifically. The effect of trade on migration can therefore be less effective for rich countries.

Table 4: estimation equation (1) – divided between low- and high-income countries

Dependent variable	(low-income)	(high-income)
	$\ln migration\ rate_{i,t}$	
$\ln trade_{i,t-1}$	0.146**	0.0859
	(0.0732)	(0.0909)
$\ln GDPpcap_{i,t-1}$	0.447*	0.233
	(0.249)	(0.250)
$popgrow_{i,t-1}$	0.136	-0.000909
	(0.145)	(0.0302)
$lifeexp_{i,t-1}$	0.00947	0.110
	(0.0323)	(0.0721)
$\ln unemp_{i,t-1}$	-0.0218	-0.0157
	(0.130)	(0.132)
Observations	608	409
Year FE	Yes	Yes
Country FE	Yes	Yes

Robust standard errors, clustered at country level, in parentheses.
*, ** and *** represent respectively statistical significance
at the 1%, 5% and 10% levels.

Here, GDP per capita is positive and significant for low-income countries, but not significant for high-income countries. The Netherlands belongs to the high-income group of countries. However, some countries in this group may have a higher GDP per capita than the Netherlands. For those countries, GDP per capita will possibly not be a determinant to migrate to the Netherlands. Persons may lose more than benefit from migrating. This would be a possible explanation for the non-significance of the effect GDP per capita for high-income countries.

7.4. Estimation of benchmark equation by continent

In Table 5, the benchmark equation (1) is estimated separate for the continents.

The coefficients for the trade variable have the expected positive sign for all continents, except for Africa. Trade has a negative and significant effect on the migration rate for African countries and a positive and significant effect for European countries.

The control variables differ over the continents with respect to the estimation of the benchmark equation. The number of observations varies from 114 to 317.

Table 5: estimation equation (1) by continent

Dependent variable	Africa	Asia	Europe	North America	South America
			$\ln migration\ rate_{i,t}$		
$\ln trade_{i,t-1}$	-0.357**	0.181	0.739**	0.0874	0.114
	(0.172)	(0.146)	(0.283)	(0.0567)	(0.119)
$\ln GDPpcap_{i,t-1}$	-0.412*	0.195	1.644***	0.513*	0.0931
	(0.229)	(0.184)	(0.430)	(0.295)	(0.148)
$popgrow_{i,t-1}$	-0.0584	0.000318	-0.0239	-0.0763	-0.224**
	(0.0846)	(0.0386)	(0.0909)	(0.133)	(0.0859)
$lifeexp_{i,t-1}$	-0.00747	-0.0370	-0.219*	0.107	0.188**
	(0.0217)	(0.109)	(0.128)	(0.0960)	(0.0643)
$\ln unemp_{i,t-1}$	0.175	-0.237	0.0936	0.255*	0.0428
	(0.137)	(0.158)	(0.205)	(0.135)	(0.112)
Observations	114	258	317	194	158
Year FE	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes

Robust standard errors, clustered at country level, in parentheses
*, ** and *** represent respectively statistical significance at the 1%, 5% and 10% levels

The estimation reports, that trade between African countries and the Netherlands has a negative influence on the migration rate from African countries to the Netherlands. This result is significant. If there is more trade with the Netherlands in one year, the migration rate to the Netherlands will decrease the next year. This indicates that trade and migration between African countries are substitutes.

As stated before, the expectation is a non-significant effect of trade on migration for African countries. There is little trading interaction with African countries and the Netherlands. Most countries in Africa are very poor. The inhabitants might be too poor to migrate. Trade with the Netherlands is so little, that no information can be conveyed from the data. However, when there is more trade, more welfare and job security is realized in the poor country through trade relationships. This results in a decline of the migration incentive.

Note also that in 2000, an estimated 35.8 percent of the illegal immigrants in the Netherlands originated from African countries (Engbersen et al, 2002). These persons are not included in the dataset. The missing of these numbers may have biased the results. More and

more detailed data is needed to draw conclusion about the effect of trade on migration for African countries.

Europe has the highest coefficient for trade of 0.739. The significant result suggests that an increase in trade between a European country i and the Netherlands leads to more migration to the Netherlands. People from Europe interact more with products from the Netherlands, which increases the knowledge of the Netherlands. In addition, the migration policy in the Netherlands and the law for labour migration is more flexible for migrants from European countries (Obdeijn et al, 2008). The migration costs are also lower due to the smaller distance between the two countries.

These reasons suggest that the effect of trade on the migration rate is more pronounced for European countries. The positive sign of the trade variable indicates that trade and the migration rate are complements.

7.5. *Individual effect of either imports or exports*

As seen in Table 2, the volume of imports and exports (in ln), does not play a significant role. As before, imports are goods shipped from country i to the Netherlands and exports are goods shipped from the Netherlands to country i. To analyse the effect of either imports or exports by themselves, some additional estimations are undertaken with three imports (exports) based variables. Therefore, some extra variables are created. The three used imports (exports) variables are: (1) the ln of the imports (exports) value to the Netherlands, (2) the ln of the imports (exports) value divided by the GDP and (3) the ln of the imports (exports) to the Netherlands divided by the total value of imports (exports). The results of the additional estimations are presented in Table 6.

The coefficients of all but one variable are positive. The coefficient of the variable where exports to the Netherlands is divided by the total value of exports is negative, but very small. The six imports and exports variables are not significant. Therefore, it can be concluded that imports (exports) between country i and the Netherlands does not have a significant impact on the migration rate to the Netherlands.

Table 6: estimation equations individual effect of either imports or exports

Dependent variable	(I1)	(I2)	(I3)	(E1)	(E2)	(E3)
			$\ln migration\ rate_{i,t}$			
$\ln imports_{i,t-1}$	0.0477					
	(0.0900)					
$\ln impGDP_{i,t-1}$		0.0809				
		(0.0961)				
$\ln qua\_imp_{i,t-1}$			0.00123			
			(0.0827)			
$\ln exports_{i,t-1}$				0.0247		
				(0.0395)		
$\ln expGDP_{i,t-1}$					0.0406	
					(0.0404)	
$\ln qua\_exp_{i,t-1}$						-0.00478
						(0.0473)
$\ln GDPpcap_{i,t-1}$	0.368*	0.421*	0.407*	0.394*	0.426*	0.406*
	(0.208)	(0.219)	(0.220)	(0.219)	(0.219)	(0.220)
$popgrow_{i,t-1}$	0.0222	0.0228	0.0217	0.0228	0.0238	0.0213
	(0.0304)	(0.0300)	(0.0309)	(0.0309)	(0.0307)	(0.0313)
$lifeexp_{i,t-1}$	0.0260	0.0246	0.0156	0.0254	0.0231	0.0166
	(0.0946)	(0.0943)	(0.0954)	(0.0940)	(0.0948)	(0.0937)
$\ln unemp_{i,t-1}$	0.0175	0.0183	0.0145	0.0182	0.0187	0.0146
	(0.0282)	(0.0290)	(0.0300)	(0.0271)	(0.0265)	(0.0304)
Observations	1017	1017	987	1017	1017	987
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors, clustered at country level, in parentheses. *, ** and *** represent respectively statistical significance at the 1%, 5% and 10% levels.

To summarize, trade with the Netherlands is empirically positively related to the migration rate to the Netherlands. Therefore, trade and migration can be seen as complements. There is evidence that trade is an additional migration determinant for immigration flows into the Netherlands. Thus a restrictive trade policy for controlling migration can be designed for certain countries. Imports and exports between a country and the Netherlands by themselves seem not to have an individual significant effect on the migration rate towards the Netherlands.

7.6. *Discussion*

There are some limitations and some recommendation for future research. Two main problems can occur in this panel data: endogeneity and reverse causality.

A typical problem with this type of data is that the independent variable is correlated with the error term. This is the endogeneity problem which results in a biased estimation. This can be the result of, for example, year shocks. To address this problem, year and country fixed effects are included in the estimation. These fixed effects capture all the unobserved effects that are constant over time in a specific country or are common annual shocks for all countries. Another solution to deal with endogeneity is an instrumental variable approach, which is used in the study of Aguiar et al (2007).

Another problem is the reverse causality of trade and migration. In this thesis the effect of trade on the migration rate is investigated. However, there are two factors in which migrants themselves have impact on trade. Migrants can reduce the transaction costs of trade due to their knowledge of the language, laws and customs of their origin country and similar countries. Second, migrants impact trade through consumption preferences. Migrants want to buy products from their origin country, which increases the demand in the destination country of goods from the country of origin (Parsons et al, 2014; Genc et al, 2011). The dependent variables are lagged one year in relation to the migration rate to avoid reverse causality.

In this thesis, the hypothesis was that trade and migration are complements, because short run effects are examined. However, trade and migration are assumed substitutes in the long-term. For further research, the turning point between complements and substitutes could be investigated.

A limitation in researching immigration is that data on immigration includes only the officially registered persons. Data on illegal migrants by country and over time is not available and are therefore not included in the data.

In addition, all the different migrations motives are included in the data. However, labour migration might be mostly influenced by trade. For this thesis the data concerning labour immigrants sorted by country was not available. For further research, trade can be studied as migration determinant for especially labour immigrants. The relationship between trade and labour migration is expected to be more pronounced.

In this thesis, the ratio immigration/emigration or the total migration between the Netherlands and another country, either origin as destination are not considered. Since 2002

more people leave the Netherlands than come into the country (Obdeijn et al, 2008). The Netherlands is the only West-European country with an emigration surplus. Emigration occurs mostly to the neighbouring countries Belgium and Germany. However, their lives remain oriented to the Netherlands. Cohesion between immigration, emigration and the imports and exports between an origin country and a destination country is interesting to investigate in future research.

Finally, the amount of 1017 observations limits the conclusions. Widening the scope with respect to the range of years and both origin as well as destination (e.g. inclusion of France, Germany and Great Britain) would give more substantial insights.

8. Conclusion

The central objective of this thesis is to relate empirically bilateral trade flows between various countries and the Netherlands with the migration rate from these countries to the Netherlands.

By using a fixed effect model including both year and country fixed effects, trade shows to have a significant and positive effect on the migration rate. If there is a rise in trading, the migration rate rises. The positive effect of trade on the migration rate indicates that trade and migration can be seen as complements. This result indicates that trade is an additional migration determinant.

The robustness checks, including inflation and school enrolment variables, confirm a positive and significant effect of trade on migration. Differentiating between poor (low-income) and rich (high-income) countries, there remains a positive effect of trade on the migration rate. The impact is only significant for low-income countries. When separating for continents, Africa and Europe are the only continents which have a significant effect of trade on migration. The effect of trade on the migration rate is negative for African countries and positive for European countries. Europe has a similar result as observed in the benchmark equation. When analysing the effect of imports and exports on the migration rate, no significant effect is found. Changes in bilateral trade flows are thus likely to have a significant impact on the migration rate.

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- Website CEPII: http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp

- Website IMF: http://www.imf.org/

- Website IND (immigration and naturalization service): https://ind.nl/EN/organisation/themes/modern-migration-policy

- Website Statline, CBS: http://statline.cbs.nl/

- Website World Bank, for the World Development Indicators: http://data.worldbank.org/data-catalog/world-development-indicators

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10. Appendix

Figure 3: Immigration trend for the Netherlands for the period 1995-2011
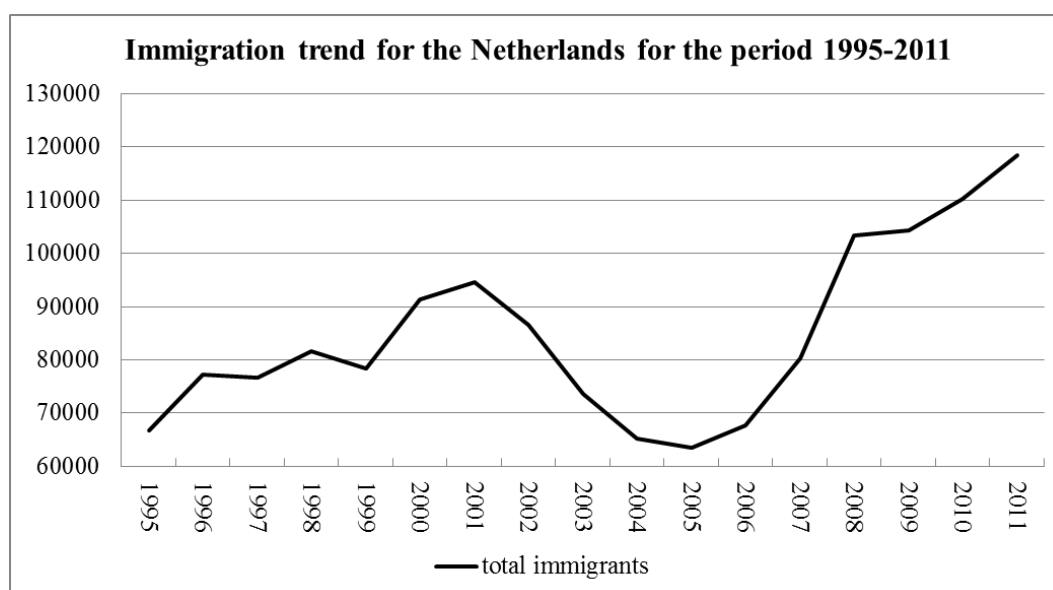
Source: website statline.cbs.nl

Appendix A: data overview

Table A-1: Average migration inflows into the Netherlands, by country of origin for 1996-2012

ISO code	Countries	Average migration inflow	ISO code	Countries	Average migration inflow
AFG	Afghanistan	2334	LBN	Lebanon	172
AGO	Angola	696	LBR	Liberia	138
ALB	Albania	97	LBY	Libya	76
ARE	United Arab Emirates	75	LCA	Saint Lucia	5
ARG	Argentina	244	LIE	Liechtenstein	1
ASM	American Samoa	1	LKA	Sri Lanka	413
ATG	Antigua and Barbuda	3	LSO	Lesotho	6
AUS	Australia	846	LUX	Luxembourg	48
AUT	Austria	392	MAC	Macao SAR of the P.R.	9

BDI	Burundi	209		of China	
BEL	Belgium	2248	MAR	Morocco	4041
BEN	Benin	29	MCO	Monaco	4
BFA	Burkina Faso	30	MDG	Madagascar	10
BGD	Bangladesh	80	MDV	Maldives	2
BGR	Bulgaria	1928	MEX	Mexico	356
BHR	Bahrain	7	MHL	Marshall Islands	1
BHS	The Bahamas	3	MLI	Mali	15
BLZ	Belize	2	MLT	Malta	28
			MM		
BMU	Bermuda	3	R	Myanmar	67
BOL	Bolivia	62	MNG	Mongolia	74
BRA	Brazil	1104	MNP	Northern Mariana Islands	1
BRB	Barbados	6	MOZ	Mozambique	50
BRN	Brunei Darussalam	24	MRT	Mauritania	27
BTN	Bhutan	35	MUS	Mauritius	17
BWA	Botswana	14	MWI	Malawi	17
CAF	Central African Republic	4	MYS	Malaysia	235
CAN	Canada	741	MYT	Mayotte	2
CHE	Switzerland	398	NAM	Namibia	29
CHL	Chile	182	NCL	New Caledonia	2
CHN	China	3602	NER	Niger	40
CIV	Cote d'Ivoire	98	NGA	Nigeria	563
CMR	Cameroon	190	NIC	Nicaragua	26
COG	Republic of the Congo	99	NOR	Norway	326
COL	Colombia	697	NPL	Nepal	168
COM	Comoros	2	NZL	New Zealand	297
CPV	Cape Verde	277	OMN	Oman	40
CRI	Costa Rica	59	PAK	Pakistan	756
CUB	Cuba	116	PAN	Panama	18
CYM	Cayman Islands	2	PER	Peru	259
CYP	Cyprus	45	PHL	Philippines	774
DEU	Germany	6764	PLW	Palau	1

DJI	Djibouti	9	PNG	Papua New Guinea	9
DMA	Dominica	8	POL	Poland	7399
DNK	Denmark	378	PRI	Puerto Rico	10
DOM	Dominican Republic	585	PRK	D.P.R. of Korea	6
DZA	Algeria	221	PRT	Portugal	1250
ECU	Ecuador	174	PRY	Paraguay	12
EGY	Arab Republic of Egypt	730	PYF	French Polynesia	2
ERI	Eritrea	123	QAT	Qatar	6
ESP	Spain	1782	ROM	Romania	1293
ETH	Ethiopia	458	RWA	Rwanda	106
FIN	Finland	445	SAU	Saudi Arabia	134
FJI	Fiji	6	SDN	Sudan	536
FRA	France	2146	SEN	Senegal	66
FRO	Faeroe Islands	1	SGP	Singapore	188
FSM	Federated States of Micronesia	1	SLB	Solomon Islands	3
			SLE	Sierra Leone	465
GAB	Gabon	10	SLV	El Salvador	18
GBR	United Kingdom	4305	SMR	San Marino	1
GHA	Ghana	747	SOM	Somalia	1999
GIB	Gibraltar	2	STP	Sao Tome and Principe	8
GIN	Guinea	283	SUR	Suriname	3233
GMB	Republic of the Gambia	49	SWE	Sweden	557
GNB	Guinea-Bissau	23	SWZ	Swaziland	5
GNQ	Equatorial Guinea	5	SYC	Seychelles	3
GRC	Greece	1077	SYR	Syrian Arab Republic	412
GRD	Grenada	3	TCA	Turks and Caicos Islands	1
GRL	Greenland	2	TCD	Chad	8
GTM	Guatemala	46	TGO	Togo	109
GUM	Guam	1	THA	Thailand	825
GUY	Guyana	63	TMP	Timor-Leste	1
HKG	Hong Kong S.A.R. of the P.R. of China	192	TON	Tonga	2
			TTO	Trinidad and Tobago	30

HND	Honduras	25		TUN	Tunisia	204
HTI	Haiti	70		TUR	Turkey	5314
HUN	Hungary	1083		TZA	Tanzania	128
IDN	Indonesia	2409		UGA	Uganda	135
IND	India	1867		URY	Uruguay	40
IRL	Ireland	485		USA	United States	3339
IRN	Islamic Republic of Iran	1373		VCT	Saint Vincent and the Grenadines	3
IRQ	Iraq	3113				
ISL	Iceland	74		VEN	Bolivarian Republic of Venezuela	256
ISR	Israel	422				
ITA	Italy	1751		VIR	U.S. Virgin Islands	2
JAM	Jamaica	58		VNM	Vietnam	433
JOR	Jordan	57		VUT	Vanuatu	2
				WSM	Samoa	3
JPN	Japan	1229				
KEN	Kenya	203		YEM	Republic of Yemen	42
KHM	Cambodia	23		ZAF	South Africa	1043
KIR	Kiribati	1		ZAR	Democratic Republic of the Congo	365
KNA	Saint Kitts and Nevis	7				
KOR	Republic of Korea	480		ZMB	Zambia	74
KWT	Kuwait	94		ZWE	Zimbabwe	106
LAO	Laos	9				

Table A-2: Overview variables

Dependent variable	Description
$\ln migration\ rate_{i,t}$	$inflow_{i,t}/population_{i,t}$ (in ln)
Independent variables	**Description**
$\ln trade_{i,t-1}$	Measured as openness index (in ln): $$(vol\_exp_{i,t-1} + vol\_imp_{i,t-1})/GDP_{i,t-1}$$
$\ln imports_{i,t-1}$	Volume of imports ($i \rightarrow NLD$), in current US\$ (in ln)
$\ln exports_{i,t-1}$	Volume of exports ($NLD \rightarrow i$), in current US\$ (in ln)
$\ln GDPpcap_{i,t-1}$	GDP per capita, in current US\$ (in ln)
$popgrow_{i,t-1}$	Population growth (annual %)
$lifeexp_{i,t-1}$	Life expectancy at birth, in total of years
$\ln unemp_{i,t-1}$	Unemployment (% of the total labour force) (in ln)
$commonlang_i$	Common official or primary language with the Netherlands (dummy)
$wdist_i$	Weighted distance (pop-wt,km)
$border_i$	Common border with the Netherlands (dummy)
$colony_i$	Current or former colony of the Netherlands (dummy)
$inflation_{i,t-1}$	Inflation, GDP deflator (annual %)
$rta_{i,t-1}$	Regional trade agreement in force (dummy)
$\ln school\_prim_{i,t-1}$	School enrolment, primary in % gross (in ln)
$\ln school\_sec_{i,t-1}$	School enrolment, secondary in % gross (in ln)
$\ln school\_ter_{i,t-1}$	School enrolment, tertiary in % gross (in ln)
$\ln impGDP_{i,t-1}$	Imports as % of GDP (in ln)
$\ln expGDP_{i,t-1}$	Exports as % of GDP (in ln)
$\ln qua\_imp_{i,t-1}$	imports Netherlands as % of total imports (in ln)
$\ln qua\_exp_{i,t-1}$	exports Netherlands as % of total exports (in ln)

Table A-3: Summary Statistics

Variables	Observations	Mean	Std. Dev.	Min	Max
$\ln migration\ rate_{i,t}$	2489	-11.0956	1.6553	-16.9860	-2.8474
$\ln trade_{i,t-1}$	1972	-4.4356	1.1105	-9.8591	-1.0391
$\ln GDPpcap_{i,t-1}$	2484	7.9494	1.7131	4.2387	12.2119
$\ln imports_{i,t-1}$	2325	18.3317	2.7252	8.4617	25.8769
$\ln exports_{i,t-1}$	2325	17.9330	3.5869	4.6052	25.2937
$popgrow_{i,t-1}$	2675	1.6408	1.2923	-7.9549	17.3555
$lifeexp_{i,t-1}$	2513	66.7806	10.9029	29.1002	82.9955
$\ln unemp_{i,t-1}$	1286	1.9466	0.6559	-0.6591	4.0860
$commonlang_i$	3434	0.0099	0.0990	0	1
$wdist_i$	3434	8.6050	0.8021	5.0810	9.8193
$colony_i$	3434	0.0297	0.1698	0	1
$border_i$	3434	0.0099	0.0990	0	1
$inflation_{i,t-1}$	2480	14.1416	142.3744	-33.5316	5399.5260
$rta_{i,t-1}$	2325	0.1970	0.3978	0	1
$\ln school\_prim_{i,t-1}$	1958	4.5912	0.2299	3.0863	5.1554
$\ln school\_sec_{i,t-1}$	1730	4.0809	0.6593	1.6426	5.0862
$\ln school\_ter_{i,t-1}$	1379	2.6385	1.3663	-2.5764	4.8000
$\ln impGDP_{i,t-1}$	1972	-5.2648	1.2353	-10.8576	-1.6840
$\ln expGDP_{i,t-1}$	1972	-5.6775	1.8827	-14.8412	-1.5121
$\ln qua\_imp_{i,t-1}$	1880	0.0241	0.0337	0.0000	0.5335
$\ln qua\_exp_{i,t-1}$	1880	0.0257	0.0409	0.0000	0.6674

Table A-4: Correlation table (variables in benchmark equations)

	$\ln migration\ rate_{i,t}$	$\ln trade_{i,t-1}$	$\ln GDPpcap_{i,t-1}$	$\ln imports_{i,t-1}$	$\ln exports_{i.t-1}$	$popgrow_{i,t-1}$	$lifeexp_{i,t-1}$	$\ln unemp_{i,t-1}$
$\ln migration\ rate_{i,t}$	1							
$\ln trade_{i,t-1}$	0.5977	1						
$\ln GDPpcap_{i,t-1}$	0.5745	0.3520	1					
$\ln imports_{i,t-1}$	0.5151	0.5005	0.7190	1				
$\ln exports_{i.t-1}$	0.3388	0.4766	0.5962	0.8820	1			
$popgrow_{i,t-1}$	-0.3467	-0.1460	-0.2627	-0.3209	-0.2369	1		
$lifeexp_{i,t-1}$	0.4916	0.2721	0.8655	0.6161	0.5484	-0.3164	1	
$\ln unemp_{i,t-1}$	0.0389	-0.0626	-0.2728	-0.0803	-0.1672	-0.1212	-0.1974	1

Appendix B: tests

Table B-1: Hausman test

$$H_0: difference\ in\ coefficients\ not\ systematic$$
$$H_a: difference\ in\ coefficients\ systematic$$
$$\chi^2(17) = 72.17$$
$$p\ value = 0.0000$$

Table B-2: Test if year fixed effect is needed

$$H_0: no\ first\ order\ autocorrelation$$
$$H_a:\ first\ order\ autocorrelation$$
$$F(12,125) = 13.94$$
$$p\ value = 0.0000$$

Table B-3: Wooldridge test

$$H_0: no\ first\ order\ autocorrelation$$
$$H_a:\ first\ order\ autocorrelation$$
$$F(1,80) = 14.773$$
$$p\ value = 0.0002$$

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