ERASMUS UNIVERSITY ROTTERDAM
ERASMUS SCHOOL OF ECONOMICS
BACHELOR THESIS INTERNATIONAL BACHELOR ECONOMICS AND BUSINESS ECONOMICS

THE RELATIONSHIP BETWEEN INTERNATIONAL TRADE AND THE WELLBEING OF A NATION: an empirical analysis.

Abstract

International trade has been increasing in most countries due to ever increasing globalization. This paper evaluates the relationship between the increasing levels of international trade and the wellbeing of a nation. This relationship is analyzed in both a repeated cross sectional and time series setting. Exports are found to not have a positive relationship with happiness in both a repeated cross sectional and time series setting. Imports show the same result in a repeated cross sectional setting. However, import growth does show a positive relationship with happiness. Finally, this paper also looks into the effects of international trade on the wellbeing of different members of society. It is hypothesized that the the Chinese export boom, starting in the 90s, decreases the happiness of unskilled workers and increases the happiness of highly skilled workers. The analysis performed shows that this hypothesis only holds for the unskilled workers. Highly skilled workers are not significantly affected in terms of happiness by the Chinese export boom.

Author: Sam Hoey
Supervisor: Olivier Marie
Second assessor:

Table of Contents

Introduction and motivation

> *It does not allow for the health of our children, the quality of their education, or the joy of their play. It does not include the beauty of our poetry or the strength of our marriages, the intelligence of our public debate or the integrity of our public officials. It measures neither our courage, nor our wisdom, nor our devotion to our country. It measures everything, in short, except that which makes life worthwhile….*
>
> Senator Robert F. Kennedy on Gross Domestic Product (Kennedy, 1968)

Economists have spent countless hours on measuring, evaluating and analyzing the most important economic indicator called *gross domestic product* (GDP). GDP is seen by many as a general indicator of a nation's wellbeing. However, if one admits that there is more to life than money, it is time for economists to shift their focus to a new variable: general wellbeing (*The Economist,* 2010). Easterlin (1974) has already laid the foundation of happiness research in the field of economics. He finds that richer countries, or countries with a higher GDP are happier than poorer countries. However, this finding only holds in a cross sectional setting. Easterlin (1974) shows that happiness has not increased in the United States (US), despite great increases in GDP. This finding is known as the Easterlin paradox. Veenhoven & Hagerty (2006) have disputed this finding by showing increasing trends in happiness over time in several nations.

In line with Easterlin's findings, most happiness research in the field of economics has been concerned with GDP and its effect on the wellbeing of a nation. Little research has been conducted on other key macroeconomic variables and their effect on wellbeing. This is where this paper aims to expand upon the current database of happiness research in economics. Specifically, the following research is concerned with evaluating the effect of international trade on the wellbeing of a nation and on the wellbeing of different subgroups of the population.

Exports and imports are increasingly important at this point in time. England has voted to leave the European Union (EU) and new trade deals will have to be negotiated between the EU and England. To what extent will these two entities be bargaining about the happiness of their respective nations?

In the United States international trade is also a current topic. President Trump's anti-trade policies are likely to have a negative effect on the US openness to trade. Will this negative effect on US openness to trade translate into lower wellbeing of US citizens? The effects of openness to trade in the US are evaluated for different subgroups of the US population. People that work in import sensitive industries might suffer from increasing openness to trade, when compared to people who do not work in import sensitive industries. Based on this introduction, the following research question is formulated:

What effect does international trade have on the general wellbeing of a nation and who are the losers and the winners from increasing international trade?

Overview of literature and hypotheses

Frey and Stutzer (2002) show that happiness research is not only relevant at a microeconomic level. Governments can use research on macroeconomic factors and their effect on happiness to determine optimal policy. In this case optimal policy would lead to the highest amount of experienced utility of its citizens and not some other monetary measure. With the use of marginal rates of substitution, regression analysis can point out what macroeconomic factors could be traded for one another to increase overall wellbeing. An example of such a trade off is exemplified by Tella & MacCulloch & Oswald (2003). They show that an increase in the unemployment rate of 1.5% can be compensated by a 260$ dollar increase in GDP per capita.

GDP, Economic growth and Happiness

The GDP formula implies that there is certainly a correlation between GDP and international trade. To be able to determine the effect of international trade on happiness effectively, the relationship between GDP and happiness must be evaluated first. A fair amount research has been done on the effects of GDP and economic growth on happiness. Richard Easterlin started the adaptation of happiness research into the discipline of economics in 1974. Easterlin (1974) claims that happiness does have a positive correlation in a cross-sectional setting, but that an increase in GDP within a nation does not lead to higher happiness. Easterlin revised his work in 1995, using more data and came to the same conclusion.

Veenhoven & Hagerty (2003) criticize earlier papers (including Easterlin (1995)), insisting that weak statistical power in analyses has been misinterpreted as evidence against the absolute utility model, which states that higher income leads to increased happiness. Adding more data, Veenhoven and Hagerty find that happiness is in fact a trending variable and has a positive correlation with GDP over time.

Tella et al. (2003) do not pick sides in the argument between Easterlin and Veenhoven, but instead try to analyze the effect of GDP on happiness by evaluating economic recessions. In addition to the unemployment GDP trade-off as described above, the paper shows that an increase of $1000 in GDP per capita has a significant impact on the distribution of happiness. The distribution of happiness is categorical. In this case it means that an increase in GDP of $10.000 raises the number of people in the top happiness category (“very satisfied” with their life) by 3.6% and lowers the number of people in the lowest happiness category (“not at all satisfied” with their life) by 0.7%. A distinct feature in this paper is that it uses microeconomic data from 271.224 observations and adds macroeconomic data, such as GDP, to each observation to evaluate its effect. This method of analysis allows to control for personal attributes, which may be of a confounding nature.

While considerable research has already been done on this topic, this paper also evaluates the relationship between GDP and happiness. This is done for two reasons: the first is that the data set that is used in this paper differs from the other papers in that it has data points for more years – this may shed new light on the relationship between GDP and happiness. The second reason is that the relationship between GDP and happiness in the used data set has to be known to be able to adequately estimate the effect of international trade on happiness. This is primarily due to the fact that there is a correlation by definition between GDP and international trade, as exemplified by the GDP formula. In the estimation of the relationship between GDP and happiness, this paper also does not aim to pick sides in the argument between Easterlin and Veenhoven & Hagerty. From the previous reasoning the following hypothesis is derived.

Hypothesis 1: GDP has a positive effect on the wellbeing of a nation.

International trade

International trade is essential for economic growth on average. This is confirmed both in theoretical and empirical settings. The theoretical Ricardian model of international trade shows that international trade leads to countries developing comparative advantages through specialization, which leads to increased economic growth. In other words, international trade leads to a more efficient allocation of economic resources. (Lopez, 2005). The theoretical Hecksher-Ohlin model shows that countries trade the good which intensively requires production factors in which the country is factor-abundant. As economies open up to trade, resources shift towards the sectors in which the country is factor-abundant, leading to an increase in production and GDP (Lopez, 2005). Baldwin (1992) uses the Solow growth model to explain that the steady state of production factors can be influenced by openness to trade. The paper presents the idea that trade liberations increase the GDP and in some cases consumption, in both a static and dynamic way. As a country moves to its new steady state, there are output and consumption multiplier effects that persist even after the new steady state is reached.

In empirical research similar conclusions are reached: openness to trade has a positive effect on GDP and economic growth. Dollar (1992) evaluates data from 95 developing countries. The paper finds that trade oriented countries experience rapid GDP growth as compared to countries that are less open to trade. Harrison (1996) employs a different approach, in which the effects of trade policy on economic growth are evaluated. The paper finds significant values for different measures of openness to trade, but warns for reverse causality. Causality between economic growth and openness to trade seems to run in both directions, meaning that economic growth could also lead to higher levels of openness to trade.

The degree of openness to trade seems to matter for economic growth (increase in GDP), which is shown to have a positive correlation with the happiness of a nation. Little research has been done on how this increase in economic growth due to increased international trade translates into increased happiness. The following hypothesis is derived:

Hypothesis 2: International trade has a positive effect on the wellbeing of a nation.

Tella & MacCulloch (2008) briefly look at the effect of openness to trade on happiness in a paper that evaluates various correlations with happiness. The paper uses imports and exports as a percentage of GDP as a proxy for openness to trade. Their findings include a weakly positive correlation between openness to trade and GDP, which could lead to a net happiness gain due to higher output. However, there is also a negative effect present in the form of increased variability in output. This phenomenon seems to have a greater effect on individuals in lower income groups as compared to individuals in higher income groups. This last effect is evaluated in the third hypothesis.

International trade and happiness (re)distribution

The second hypothesis analyzed the effect of international trade on a nation's wellbeing. The third hypothesis looks at the effects of international trade on various specific groups within a country, specifically the US. Autor & Dorn & Hanson (2016) evaluate the effect of increasing US imports from China on lifetime incomes and unemployment levels of import exposed laborers. The paper identifies the increase of Chinese exports, starting in the 1990s, as a permanent shock to the United States economy. The results show that there are elevated levels of unemployment in the US manufacturing industry due to slow labor market adaptation, meaning that laborers are slow to adapt to increasing international trade. Part of this increase in unemployment in manufacturing industries can be attributed to the substitution of high skilled workers for low skilled workers. Tella et al. (2003) and the data discussion above show that both personal income and unemployment have strong respective positive and negative effects on happiness. The following analysis tries to estimate a causal effect of the Chinese trade shock on average happiness levels of potential losers and winners from this development. For the purposes of this analysis potential winners and losers from increased international trade are identified with the use of the following description by Krugman and Obstfeld (2005, p65).

Krugman and Obstfeld (2005, p64) write the following about international trade in the US: *"Owners of a country's abundant factors gain from trade, but owners of a country's scarce factors lose... Compared with the rest of the world the United States is abundantly endowed with highly skilled labor and (...) low-skilled labor is correspondingly scarce. This means that international trade tends to make low-skilled workers in the United States worse off---not just temporarily, but on a sustained basis." (As cited in Autor et al., 2016)*

This description by Krugman & Obstfeld (2005, p64) has also been confirmed in empirical and theoretical papers. Borjas & Ramey (1994) find that there is a clear correlation between the imports of durable goods and wage inequality within the US. Foreign competition in import sensitive industries can put pressure on wages within these industries, leading to income inequality. According to the Heckser-Ohlin model increases in international trade cause resources to flow to the country's abundant factors of production. Wages increase in these industries and wages decrease in industries in which the country is not factor-abundant (Burtless, 1995). This increase in the wage-gap due to international trade calls for

domestic labor market adaptation to balance out factor prices. However, Autor et al. (2016) find that labor market adaptation is slow in the US, leading to sustained wage inequality.

Causal Analysis

Having defined the potential winners and losers from international trade, the theoretical analysis on the Chinese trade shock will now resume.

Developments in the 1990s shifted China's comparative advantage from primary commodities to labor intensive manufactured goods (Autor et al., 2016). In 1990 China moved from a negative to positive *revealed comparative advantage* (RCA) in labor intensive manufactured goods. The opposite happened for primary goods. This shift in RCA values is primarily the result of the migration of around 250 million farmers to the cities, making China factor-abundant in low-skilled labor (Li & Li & Wu & Xiong, 2012). This shift in comparative advantage in 1990 altered trade patterns in favor of the Chinese manufacturing industry and hurt the US manufacturing industry. As a result, US manufacturing laborers are hurt in terms of income and employment (Autor et al., 2016).

The following analysis aims to evaluate if the sustained wage inequality and increased unemployment among low skilled laborers within the US, as identified by Autor et al. (2016), leads to increased differences in average happiness levels (larger happiness gap) between the winners and losers from international trade. The Chinese trade shock to US imports is used to evaluate this objective. Potential winners and losers are identified in accordance with the description of Krugman & Obstfeld (2005, p64), meaning that low skilled workers are potential losers and high skilled workers are potential winners. Based on the previous, the following hypothesis is formulated:

Hypothesis 3: The happiness gap between highly skilled and low skilled workers has increased as a result of the Chinese export boom.

It could also be the case that both highly skilled workers and low skilled workers adapt to their respective higher and lower wages. In this case, a relatively slow increase in the wage gap between the two groups would not have a significant effect on their happiness levels. This concept of adaptation is also used by Easterlin (1974) to explain why gradual increases in GDP per capita do not increase the average level of wellbeing within a country.

Conceptual issues when analyzing happiness data

Analyzing happiness data brings multiple conceptual issues along with it. The most important ones are:

1. Happiness data consists of self-reported survey data. Self reported happiness data is limited by the fact that individuals either do not know how happy they are or conform to some social norm when replying to the question "how happy are you?" or "how satisfied are you with your life". Tella et al. (2003) discuss this issue in depth. Regression analysis shows that countries with higher self-reported happiness, have lower suicide rates. If suicide is regarded as the ultimate state of unhappiness, then this finding shows that happiness data does serve as an approximation of true happiness of the individual. While the following analysis is limited to self-reported happiness data (true happiness is unobservable), this problem is dealt with by the use of large data sets, which average out the errors in happiness data for subgroups of the population. In addition, country fixed effects and year fixed effects are added.
2. International trade in the form of exports and imports is not exogenous. Elected officials have great influence on these variables. Trump's anti-trade policy is likely to have a negative effect on international trade. However, Trump was chosen by the US citizens themselves, indicating that they believe their wellbeing to be ameliorated by Trump's policy objectives.
3. Ecological fallacy. The ordered probit models used in this paper estimate the coefficients for the entire population sample. It could very well be the case that coefficients differ among subgroups of the population. Hypothesis 3 looks into this. It does mean that the coefficients found in analysis of the first and second hypothesis could differ significantly across sub groups of the population.

Discussion of data

Control variables

For the analysis of macroeconomic variables and their effects on happiness it is important to have as many data points as possible. This paper uses the Eurobarometer Survey Series (1973 – 2002, with gaps) and the General Social Survey (GSS) (1972 – 2017, with gaps). Both surveys ask how "satisfied one is with one's life" (Eurobarometer) or how "happy one is in life" (GSS). Happiness data is measured on different scales for both data sets. These are summarized in the *table 1*.

Table 1: Happiness data Eurobarometer Survey Series and General Social Survey

Response Eurobarometer	Assigned value	Response GSS	Assigned value
"Not at all satisfied"	1	**"Not too happy"**	1
"Not very satisfied"	2	**"Pretty happy"**	2
"Fairly satisfied"	3	**"Very happy"**	3
"Very satisfied"	4		

Inter-comparison of the data sets is not possible, because the happiness scales are defined differently, which means that respondents may have given a different answer in the other survey due to framing effects. The Eurobarometer surveys set has four happiness categories as compared to the GSS having three. Having four categories encourages more introspection. The middle option, "pretty happy", may be seen as a focal point in the GSS. The Eurobarometer Survey does not have such a middle option. For this reason, the data sets are analysed separately.

Both data sets contain micro level data for happiness and various other socioeconomic indicators for each observation. These variables and their relationship with happiness are summarized in *table 2*, which can be found on the next page. Ordered probit functions were used for both data sets, including year fixed effects and country fixed effects.

Table 2: Relationship between happiness and personal control variables.

Independent Variables Europe	Coef. Europe	p-value	Independent Variables United States	Coef. US	p-value
Unemployed	-0.496	0.000	**Unemployed**	-0.342	0.000
Retired	0.014	0.028	**Retired**	0.006	0.737
House	0.025	0.000	**House**	-0.022	0.159
School	0.237	0.000	**School**	0.100	0.000
Male	-0.047	0.000	**Male**	-0.088	0.000
Age	-0.032	0.000	**Age**	-0.014	0.000
Age Squared	0.0003	0.000	**Age Squared**	0.0002	0.000
Income Quartile:			**Relative Income:**		
2	0.174	0.000	**below average**	0.209	0.000
3	0.285	0.000	**average**	0.507	0.000
4	0.461	0.000	**above average**	0.633	0.000
			far above average	0.589	0.000
Education	0.022	0.000	**Education**	0.022	0.000
Married	0.220	0.000	**Married**	0.541	0.000
Children:			**Children:**		
one	-0.045	0.000	**one**	-0.113	0.000
two	-0.046	0.000	**two**	-0.098	0.000
three or more	-0.103	0.000	**three or more**	-0.092	0.000

Observations for Eurobarometer dataset: 492550. Observations for GSS: 57179. Controlled for year and country fixed effects.

All the variables in *table 2* are used as control variables in the analysis to follow. For all variables the outcomes *don't know*, *no answer*, *refused* and *inapplicable* are recoded to missing values and are thus not accounted for in the analysis to follow. Both models in *table 2* estimate the proportional distribution of observations across happiness categories within 1% accuracy *(See appendix B, table 1).* This is an indication that the control variables used are good at predicting happiness.

The first four variables control for occupation. The coefficients are compared to the base value of having some sort of paid job. The house variable is a dummy that takes the value 1 if the person in question is responsible for the housekeeping and possibly children as well. An age squared coefficient was included, as it general consensus states that happiness is U-shaped with age. (Tella & MacCulloch, 2008)

Income was divided into quartiles for Europe based on the distribution of the data. This had to be done for a number of reasons. Income data has been collected in many different ways over the years 1973 – 2002. First of all, the number of defined income categories differed across years and countries. Secondly, income was specified in different currencies. Thirdly, some surveys asked for yearly income, others for monthly income. A nested loop equation, along with the *xtile* function, was used to unify the

income values into quartiles in order to make the income variable usable. Applying this function makes the income variable slightly less accurate due to the fact that the distribution of the income categories across surveys may not exactly cut off at the specified quartiles. As a result, the distribution of observations across income quartiles is not exactly 25% per quartile. For the United States that procedure was not possible, because the highest defined income category for the General Social Survey contained more than 50% of the observations, making a division into quartiles impossible. Instead, this paper uses subjective relative income as a substitute. This variable contains self reported relative income for each observation. The variable is divided into five categories: *far below average*, *below average*, *average*, *above average* and *far above average*. The fact that this is a subjective variable doesn't make it less suitable for happiness research, as it is likely that utility is not derived from absolute income, but from subjective income.

The most important control variables for Europe is income. For the US this is subjective relative income. The relationship between happiness and income is the strongest of all coefficients for both Europe and the US. As income rises, happiness goes up by a significant amount. However, the effect seems to die out in the US, which is shown by the coefficients of "above average" and "far above average". Education is positive and significant for both Europe and the US. For Europe education is defined as the age until which the person was in school. If the person is still in school, this is accounted for by the dummy variable school. For the US, education is defined as the number of years that the person attended school. The dummy variable school serves the same purpose in the US as in Europe.

Happiness data

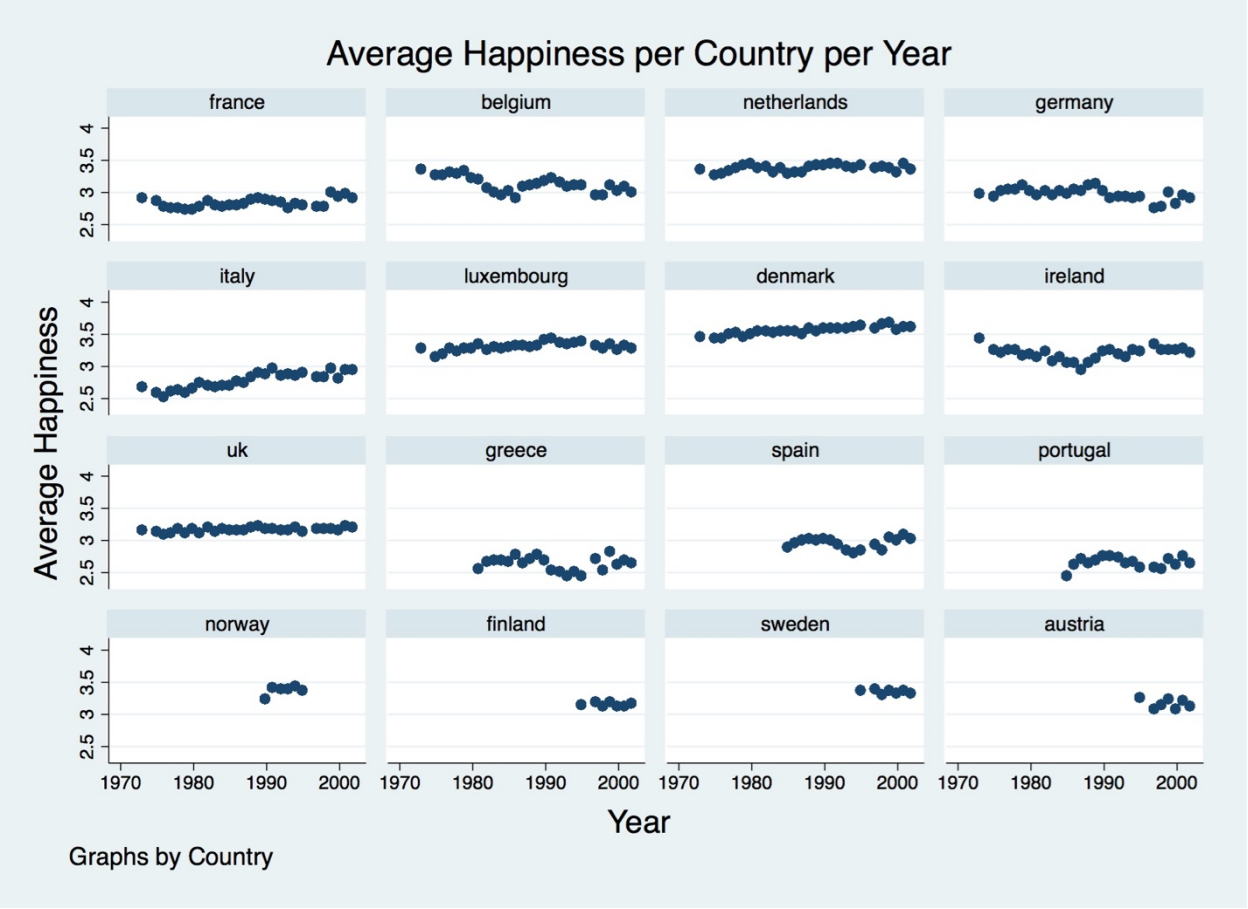
Happiness data has not been recorded for all years by some nations. The years of happiness data collection are summarized in *table 3*. The macroeconomic variables were collected for the years that happiness data was available for each country.

Table 3: years of observations per country

Time period	Countries
1973 – 2002	France, Belgium, Netherlands, Germany, Italy, Luxembourg, Denmark, Ireland, United Kingdom
1981 – 2002	Greece
1985 – 2002	Spain, Portugal
1990 – 1995	Norway
1995 – 2002	Finland, Sweden, Austria

For all countries years 1974 and 1996 are missing.

Figure 1



The US graph can be found in appendix B, figure 1. It was not included due to difference in scale for happiness between the Eurobarometer data set and the GSS.

Figure 1 shows that there is a clear difference between happiness levels across different countries. The happiest countries in this data set are the Netherlands, Denmark, Luxembourg and Sweden, all reporting average happiness levels which hover around or consistently touch the 3.5 mark on a 1 – 4 scale. The data shows that the Portuguese are on average the least happy, with happiness values between 2.5 and 3. Many countries show relatively stationary happiness levels, the UK being the most evident example. Italy, Belgium and Portugal show relatively large variation in happiness levels with no particular direction. Denmark and Italy are the only countries which shows a slight (upward) trend in happiness levels, although not conclusive. Tables 2 and 3 in *appendix B* show the variation of happiness between and within countries. They confirm what was already seen in *figure 1*. Denmark is the happiest country and Portugal is the least happy. Happiness varies the most in Italy and Belgium, but as can be seen in the graph, this variation does not have a particular direction or trend.

Macro economic variables

Macro economic variables were added to each observation in both the European and US datasets. GDP, imports and exports are the main variables of interest for hypotheses one and two. The different indicators were obtained from the OECD and the World Bank. The data were collected for the years that happiness data were available for each country. *Table 4* shows the source and the unit of each macroeconomic variable.

Table 4: Macroeconomic variables used.

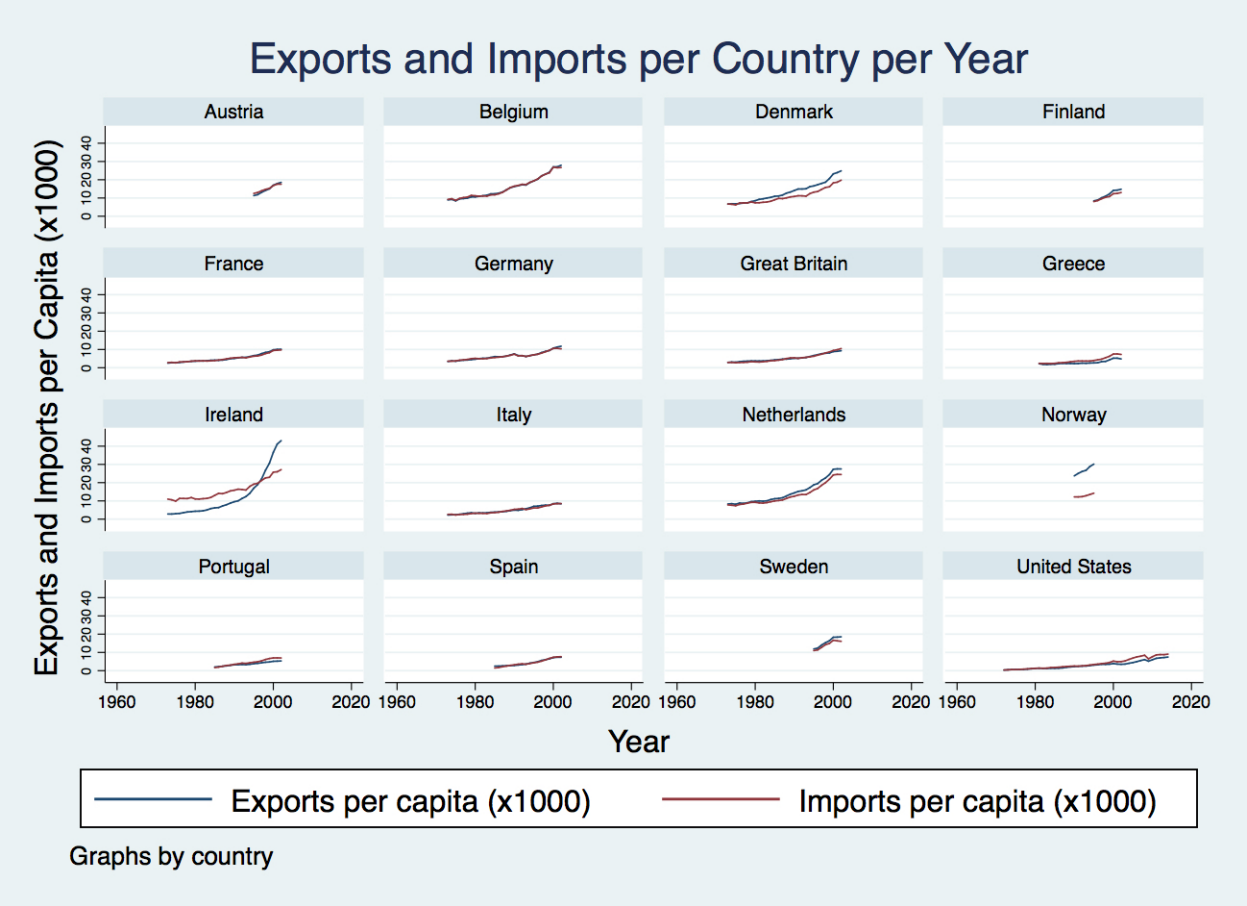
Variable	Source	Description
GDP per capita (*10.000)	OECD	Scaled to 10.000 per capita, in USD
GDP per hour worked	OECD	In 2010 USD, 2010 = 100
Exports (goods + services) per capita (*1.000)	World Bank	Constant in 2010 USD. Scaled to 1.000 per capita
Imports (goods + services) per capita (*1000)	World Bank	Constant in 2010 USD. Scaled to 1.000 per capita.
Tax Revenue	OECD	% of GDP
Total Population	OECD	In millions
Consumer price index	OECD	Year 2010 = 100

A further summary of the data can be found in *appendix B table 4* and includes the mean, within variation, between variation, minimum and maximum for each macroeconomic variable.

In addition to current year values of GDP, exports and imports, lagged values and growth rates, defined in percentages are used.

One variable that is of special importance for this paper is international trade. *Figure 2* shows how imports and exports evolve over time in the periods in which happiness data is available for each country. For scaling purposes imports and exports are shown in a *thousand USD per capita ratio.*

Figure 2



Data collected for years that happiness *data was available for each country. Luxembourg was left out of this collection of graphs as it altered the scale in such a way that the graphs would be unreadable. The Luxembourg graph can be found in appendix B, figure 2. Data is scaled using a per capita ratio, x1000.*

Figure 2 shows that there are both differences between countries and intertemporal differences within countries. Luxembourg, Belgium, the Netherlands, Ireland and Norway show very high values of exports and imports per capita, compared to the other countries. These are also the countries which show the most growth of exports and imports per capita, although this is difficult to confirm for Norway. The United States also shows significant growth in both exports and imports, which is relevant for the third hypothesis.

It is also interesting to note that some countries have current account surpluses and others do not. Luxembourg, Norway, Denmark and the Netherlands consistently run relatively large current account surpluses. The United States is traditionally a net importer. Ireland typically ran a current account deficit, but in the early nineties exports grew rapidly. All other countries do not show notable current account trends.

Methodology

Methodology for the first two hypotheses of this paper is similar to the methodology used by Tella et al. (2003). However, the inclusion of some new variables like GDP per hour worked in this paper may give a clearer picture of the examined relationships. In addition, this paper uses more data (larger time span), which should lead to more precise results.

Hypothesis 1: GDP has a positive effect on the wellbeing of a nation.

For this hypothesis the Eurobarometer data set is used. Using this data set has the advantage that there are more GDP data points available, because there are more countries to analyse compared to the GSS. With these data points, variation of happiness between and within countries can be evaluated.

The hypothesis is tested with a series of ordered probit models. The probit models can be described by the following general formula:

$$Happiness_{tij} = \alpha * Personal_{tij} + \beta_1 * \frac{GDP}{Capita} + \beta_2 * Macro_{ij} + \gamma_i + \delta_j + \varepsilon_{tij} \qquad (Formula\ 1)$$

Happiness is the reported happiness for individual *t*, in country *i,* and year *j.* Happiness is measured on a categorical scale of 1 – 4 as explained in the data section. This is the reason why an ordered probit model is preferred over an ordinary regression model. First, a *personal* vector is included, which contains all the control variables which are presented in the data section. (Lagged) GDP is the variable of interest. In consequent models (lagged) values of GDP growth*,* defined in percentages, are added and their coefficients are evaluated. Finally, other key macroeconomic variables are added to the model as part of the *macro* vector. GDP per hour worked is another variable which could be an important control macro variable. It serves as an indication of how productive labor is, which has to do with capital endowments and the inherent capabilities of the laborers, which could be seen as human capital. GDP per hour worked and GDP have a correlation coefficient of 0.7704. Adding GDP per hour worked to the ordered probit model may lead to different results. Other key economic variables such as tax revenue and inflation are added. Inflation is a very important control variable as it can have a direct effect on the purchasing power of all individuals in a given country*.* Inflation is defined as the percentual growth rates of the consumer price index*.* Tax revenue is used as a proxy for government influences on the happiness of a nation.

Country specific fixed effects are captured by *country fixed effect* γ_i. This fixed effect captures the unchanging differences between nations in the Eurobarometer dataset, such as cultural and institutional influences. Year fixed effect δ_j is also added to account for common economic shocks, which affect all nations in the Eurobarometer data set. These fixed effects are added by including country and year dummies in each ordered probit model. Finally, an error term ε_{tij} is added to capture the difference between real values and ordered probit model predictions.

Hypothesis 2: International trade has a positive effect on the wellbeing of a nation.

The second hypothesis is evaluated in a similar way as the first hypothesis. The Eurobarometer data set is used to evaluate the effect of international trade on happiness of a nation. Again, ordered probit models are used for exports and imports separately. The formulas used for the estimation of the probit models can be found below:

$$Happiness_{tij} = \alpha * Personal_{tij} + \beta_1 * \frac{Exports}{Capita} + \gamma_i + \delta_j + \varepsilon_{tij} \quad \textit{(Formula 2)}$$

$$Happiness_{tij} = \alpha * Personal_{tij} + \beta_1 * \frac{Imports}{Capita} + \gamma_i + \delta_j + \varepsilon_{tij} \quad \textit{(Formula 3)}$$

Happiness is the dependent variable. Again a *personal* vector is included to control for personal characteristics of each observation. Next the coefficients of exports and imports per capita are estimated. Per capita ratios are used to help better capture the macroeconomic effects of imports and exports on an individual level. Lagged values of exports and imports per capita are added to investigate if these variables have a lagged effect on happiness. In addition, growth rates of imports and exports are used to evaluate if the adaptation phenomenon is in effect. Again country fixed effects (γ_i), year fixed effects (δ_j) and the error term (ε_{tij}) are included. The fixed effects are added by including country and year dummies in each ordered probit model.

As in the first hypothesis, the analysis is also performed with other macroeconomic control variables. Formulas for these ordered probit models can be found below.

$$Happiness_{tij} = \alpha * Personal_{tij} + \beta_1 * \frac{Exports}{Capita} + \beta_2 * Macro_{ij} + \gamma_i + \delta_j + \varepsilon_{tij} \quad \textit{(Formula 4)}$$

$$Happiness_{tij} = \alpha * Personal_{tij} + \beta_1 * \frac{Imports}{Capita} + \beta_2 * Macro_{ij} + \gamma_i + \delta_j + \varepsilon_{tij} \quad \textit{(Formula 5)}$$

The most important macroeconomic control variable for this hypothesis is GDP per capita, which is included in the *macro* vector. Lagged values and growth rates of GDP are also included in subsequent ordered probit models. Finally, Inflation and tax revenue are also added as control variables as part of the *macro* vector.

Hypothesis 3: The happiness gap between highly skilled and low skilled workers has increased as a result of the Chinese export boom.

To effectively evaluate this hypothesis, a brief analysis is performed on international trade in the US to see if there is indeed a positive trend in the data, meaning that both exports and imports increase over the years. In addition, the Chinese trade shock is examined and confirmed using import and export data.

The GSS data set contains detailed information about the occupation of each observation, which makes it very suitable for testing the third hypothesis. Occupations in the GSS are coded according to

the International Standard Classification of Occupations of 2008 (International Labour Office, 2008). Three labor categories are defined to evaluate how their happiness changes as a result of the Chinese trade shock. The first is the group which is potentially negatively affected by the Chinese trade shock. In accordance with the classification defined by Krugman & Obstfeld (2005, p64) this group contains low skilled manufacturing workers. The second group contains the observations that are potentially positively affected by the increasing international trade, which would be highly skilled workers. The last group contains observations that are not likely to be affected by the Chinese trade shock apart from maybe having more consumer choice, which is constant for all three groups. This control group consists of people that work in the medical industry and teachers. Medical services are among the least internationally traded goods, which makes medical workers less susceptible to influences of international trade. The same goes for teachers. Exact occupations codes, descriptions and method of allocation to each group can be found in *appendix C.*

First, some descriptive analysis is performed to get a better sense of the data. Dickey-Fuller tests are used to evaluate the evolution of international trade in the United States. In addition, the stationarity of exports and imports per capita growth is tested for using a differenced Dickey-Fuller test. These tests are done for years 1973-2016, but also for the years 1990-2016. These last tests could show that the Chinese trade effect is indeed present.

Similar descriptive analysis is performed for the evolution of average happiness levels across the three different socioeconomic groups. New variables are created that show the difference in average happiness levels between the groups for each year. Subsequently, Dickey-Fuller tests are performed on these new variables.

Causal analysis

After testing the variables for stationarity, the analysis continues with a more causal focus. Difference in difference analysis is performed to evaluate if the Chinese trade shock has had an effect on the happiness gap between skilled and unskilled laborers. An ordered probit function is used to evaluate this effect. The resulting formula is as follows:

$$Happiness = \alpha * treatment + \beta * chinashock + \gamma * DID - estimator + \varepsilon \qquad \textit{(Formula 6)}$$

In this ordered probit function happiness is the dependent variable. The treatment variable takes the value 1 if the person is in the low skilled groups and the value 0 if the person is in the high skilled group. The chinashock variable takes the value 1 if the observation is in 1990 or later and the value 0 if the observation is before 1990. This year is chosen, because it is the year in which the Chinese *revealed comparative advantage* in labor intensive manufacturing went from negative to positive (Autor et al., 2016). The DID-estimator is the interaction effect between the variables treatment and chinashock. The DID-estimator shows whether the difference in happiness levels between the skilled and unskilled group increases as a result of the Chinese trade shock or not. The test is performed over the years 1973 – 2016. The Chinese trade shock is not a "one off" event. Chinese exports have continued

to grow throughout the years. In this difference in difference analysis, the period before the Chinese export uprising is compared to the period in which this development is actually happening.

Winners and losers: does the skilled group win and/or does the unskilled group lose?

If it is found that the happiness gap between the skilled and unskilled group increases as a result of the Chinese export shock, then the question still remains whether the unskilled group loses and/or the skilled group wins. According to the description of Krugman & Obstfeld (2005, p65) the skilled group should win in terms of income and the unskilled group should lose out in in terms of income, both as a result of the Chinese trade shock. However, it could be that the unskilled group loses out, while the skilled group gains nothing or vice versa. This is where the control group, containing medical workers and teachers are used to analyse whether the skilled group wins and the unskilled group loses.

Difference in difference analysis is used to evaluate if the Chinese trade shock has created a happiness gap between the skilled group and the control group. Similar difference in difference analysis is performed for the unskilled group and the control group. The formulas used, are similar to *formula 6*. The only difference is the definition of the treatment variable. For the analysis of the difference in happiness between the skilled group and the control group, the treatment variables takes the value 1 if the observation is part of the skilled group and takes the value 0 if the observation is part of the control group. For the analysis of the difference in happiness between the unskilled and the control group, the treatment variable takes the value 1 if the observation is part of the unskilled group. The value 0 is defined as being the control group.

Results

Hypothesis 1: GDP has a positive effect on the wellbeing of a nation.

This hypothesis was first tested with only the *personal vector* (see data discussion) as control variable and subsequently tested with macroeconomic control variables. The ordered probit results for the effect of GDP on happiness with only personal attributes as control variables is presented in *table 5*. A marginal effects table can be found in *appendix D table 5.*

Probit results without macroeconomic control variables

Table 5: GDP per capita models without macroeconomic controls.

Model Number	ONE	TWO	THREE	FOUR	FIVE
GDP/capita (Δ=10.000)	0.086***				
L1.GDP/capita (Δ=10.000)		0.080***			
L2.GDP/capita (Δ=10.000)			0.074***		
ΔGDP/capita (in %)				0.007***	
L1.ΔGDP/capita (in %)					0.008***
Controlled for:					
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Personal attributes	Yes	Yes	Yes	Yes	Yes
Number of observations	429.550	417.515	412.121	417.515	412.121

** = significant at 10% level, ** = significant at 5% level, *** = significant at 1% level. All models predict* happiness *proportions within 1% accuracy.*

Current (in year of observation) GDP per capita has a positive relationship with happiness in the year of each observation. Lagged values of GDP per capita also have a positive relationship with happiness, but the coefficients become smaller as the number of lags is increased to two. Current GDP shows relatively large marginal effects. An increase of GDP per capita of $10.000 shows an increase of 2.49% in the "Very satisfied" category. For the first and second lag this increase is 2.32% and 2.14%, confirming the decrease in effect of GDP per capita as lags are added. For any increase in (lagged) values of GDP the percentage of people in the "Not at all satisfied", "Not very satisfied", "Fairly satisfied" decreases by the same amount as the increase in the "Very satisfied" category. This also holds for (lagged) values of GDP growth.

(Lagged) values of GDP growth also have a positive relationship with happiness. An increase in current GDP growth of 5%, which can be seen as a period of great economic growth in OECD countries, on average leads to an increase of 1.06% of people in the "Very satisfied" category. For the lagged value of GDP growth this increase is 1.10%. This shows that GDP per capita matters in both a repeated cross sectional and a time series setting. Across countries GDP per capita leads to higher happiness levels (see

(lagged) GDP coefficients), but growth within a country also leads to higher happiness levels (see coefficients of (lagged) growth levels).

Probit results with macroeconomic control variables

The table with ordered probit models, which include macroeconomic control variables can be found in *table 6*.

Table 6: GDP per capita models with macroeconomic controls

Model Number	ONE	TWO	THREE	FOUR	FIVE
GDP/capita (Δ=10.000)	0.133***				
L1.GDP/capita (Δ=10.000)		0.129***			
L2.GDP/capita (Δ=10.000)			0.125***		
ΔGDP/capita (in %)				0.009***	
L1.ΔGDP/capita (in %)					0.009***
Inflation	-0.009***	-0.009***	-0.009***	-0.005***	-0.006***
GDP per hour worked	0.003***	0.003***	0.004***	0.006***	0.007***
Tax revenue	0.010***	0.010***	0.010***	0.011***	0.011***
Controlled for:					
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Personal attributes	Yes	Yes	Yes	Yes	Yes
Number of observations	412856	412856	409101	412856	409101

** = significant at 10% level, ** = significant at 5% level, *** = significant at 1% level. All models predict* happiness *proportions within 1% accuracy.*

Table 6 shows that the coefficients of (lagged) GDP values and GDP growth rates are larger when other macroeconomic factors are controlled for. The output indicates that inflation has a negative relationship with happiness, which is likely due to "money illusion". High values of inflation make it seem like real wages have gone down. Tax revenue also has a positive relationship with happiness, indicating that government expenditure has a positive influence on a nations wellbeing. Finally, *table 6* shows that GDP per hour worked also has a positive relationship with happiness, showing that part of GDP's positive relationship with happiness can be attributed to high productivity of workers and capital endowments.

Hypothesis 2: International trade has a positive effect on the wellbeing of a nation.

Probit results without macroeconomic control variables

For this hypothesis ordered probit models were used to evaluate the effect of exports and imports on national wellbeing. The results without macroeconomic control variables can be found in *table 7 and 8*.

Table 7: Exports per capita without macroeconomic control variables.

Model Number	ONE	TWO	THREE	FOUR	FIVE
Exports/capita (Δ=1.000)	0.0010***				
L1.Exports/capita (Δ=1.000)		0.0012***			
L2.Exports/capita (Δ=1.000)			0.0015***		
Δ Exports/capita (in %)				-0.0005	
L1.Δ Exports/capita (in %)					-0.0054***
Controlled for:					
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Personal attributes	Yes	Yes	Yes	Yes	Yes
Number of observations	**412856**	**412856**	**409101**	**412856**	**409101**

** = significant at 10% level, ** = significant at 5% level, *** = significant at 1% level. All models predict* happiness *proportions within 1% accuracy.*

The results for exports are all significant at the 1% level, except for the coefficient of Δ exports per capita, which had a p-value of 0.307. The positive results of the (lagged) values of exports per capita indicate that the more a country exports, the happier it is, in a cross sectional setting. The marginal effects tables (*appendix D tables 8 and 9*) show that for every $1000 increase of exports per capita the percentage of people in the "Very satisfied" category increases by 0.03%, 0.04% and 0.04% (current year, first lag, second lag). This is in accordance with the coefficients in *table 7*. The fact that the marginal effects grow larger as more lags are added, is an indication that the wellbeing derived from exports takes time to take effect. Current export growth was not significant, but the first lag of export growth showed a negative coefficient. Taken at face value, this would mean that exports have a positive relationship with happiness in a cross sectional setting, but that export growth within a country has a negative effect on wellbeing. The decrease of the percentage of people in the "Very satisfied" category was -0.79% for a 5% growth of exports in the previous year.

Table 8: Imports per capita without macroeconomic control variables.

Model Number	SIX	SEVEN	EIGHT	NINE	TEN
Imports/capita (Δ=1.000)	0.0007				
L1.Imports/capita (Δ=1.000)		0.0009*			
L2.Imports/capita (Δ=1.000)			0.0010*		
Δ Imports/capita (in %)				0.0051***	
L1. Δ Imports/capita (in %)					0.0025***
Controlled for:					
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Personal attributes	Yes	Yes	Yes	Yes	Yes
Number of observations	**412856**	**412856**	**409101**	**412856**	**409101**

** = significant at 10% level, ** = significant at 5% level, *** = significant at 1% level. All models predict* happiness *proportions within 1% accuracy.*

The coefficients for (lagged) values imports per capita were not significant at the 5% level. Current imports, the first lag and the second lag had p-values of 0.103, 0.062 and 0.068 respectively. At a 10% level all of them are more or less significant. Again, the coefficient is increasing in the number of lags, indicating that the happiness derived from imports takes time to reach its full effect. The increase of people in the "Very satisfied" category is 0.02%, 0.03% and 0.03% for the current year, first lag and second lag respectively. This again confirms the lagged effect of imports per capita on happiness. Contrary to export growth, import growth has a positive relationship with happiness. Both growth coefficients were significant at the 1% level. The marginal effects of 5% import growth on the "Very satisfied" category are 0.73% and 0.37% for the current year and first lag respectively. This indicates that import growth has a relatively direct effect on happiness within a nation. In conclusion, the insignificant coefficients of (lagged*)* imports per capita show that imports per capita do not have a significant relationship with happiness in a cross country setting. However*,* import growth within a country shows a positive relationship with happiness.

Probit results with macroeconomic control variables

Tables 9 and 10 below contain condensed models for exports and imports. The models are shown with the macroeconomic control variables GDP per capita*,* inflation and tax revenue. A full result table can be found in *appendix D, table 6.* The marginal effects tables for exports and imports can be found in *appendix D, table 8 and 9.*

Table 9: Exports per capita with macroeconomic control variables.

Model Number	one	two	three	four	five
Exports/capita (Δ=1.000)	-0.012***				
L1.Exports/capita (Δ=1.000)		-0.011***			
L2.Exports/capita (Δ=1.000)			-0.007***		
Δ Exports/capita (in %)				-0.001	
L1.Δ Exports/capita (in %)					-0.006***
Controlled for:					
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Personal attributes	Yes	Yes	Yes	Yes	Yes
Number of observations	**412856**	**412856**	**409101**	**412856**	**409101**

** = significant at 10% level, ** = significant at 5% level, *** = significant at 1% level. All models predict* happiness *proportions within 1% accuracy.*

The primary finding of the models in *table 9* is that (lagged) coefficients of exports per capita turn negative when macroeconomic control variables are added. The negative relationship between happiness and exports now becomes weaker as lags are added, contrary to the increasing positive relationship shown in the export models without macroeconomic controls. The current growth coefficient of exports per capita is insignificant (p-value = 0.307). The first lag of export growth is significantly negative. Overall, these results show that exports per capita have a negative relationship with happiness when important macroeconomic variables such as GDP per capita are controlled for. This holds significantly in a repeated cross sectional setting ((lagged) coefficients of exports*)*, meaning that countries with larger exports are on average less happy. In a within-country-setting (growth rate coefficients) the relationship is not as strong, because the current year export growth is insignificant.

Table 10: Imports per capita with macroeconomic control variables.

Model Number	six	seven	eight	nine	ten
Imports/capita (Δ=1.000)	-0.016***				
L1.Imports/capita (Δ=1.000)		-0.016***			
L2.Imports/capita (Δ=1.000)			-0.014***		
Δ Imports/capita (in %)				0.004***	
L1.Δ Imports/capita (in %)					0.001***
Controlled for:					
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Personal attributes	Yes	Yes	Yes	Yes	Yes
Number of observations	**412856**	**412856**	**409101**	**412856**	**409101**

** = significant at 10% level, ** = significant at 5% level, *** = significant at 1% level. All models predict* happiness *proportions within 1% accuracy. Full result table can be found in appendix D table 7.*

In *table 10* all coefficients are significant at a 1% level. Similar to exports, the coefficients for (lagged) values of imports went from positive to negative when macroeconomic variables are controlled for. The negative relationship between imports per capita and happiness remains relatively constant as lags are added. It is interesting to see that (lagged) coefficients import growth went from negative to positive, indicating that import growth within a country could have a positive effect on national wellbeing. In summary, the results show that imports and happiness have a negative relationship in a repeated cross sectional setting. However, import growth seems to have a positive relationship with happiness within a given country.

Hypothesis 3: Highly skilled workers have benefitted from increasing globalization, whereas low skilled workers have not.

Figure 3

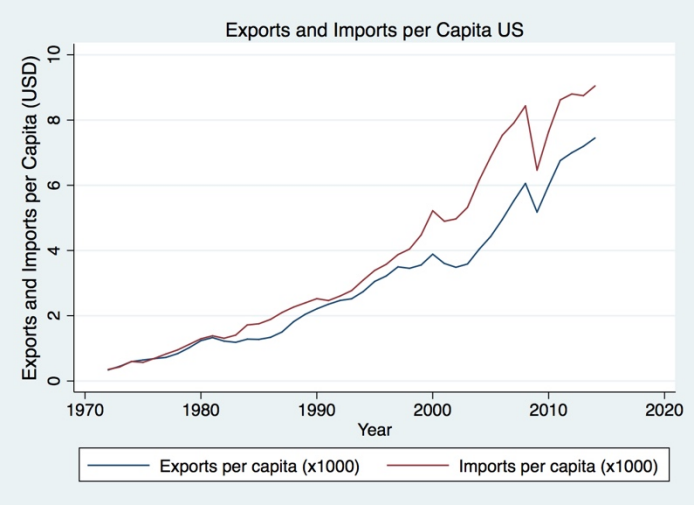
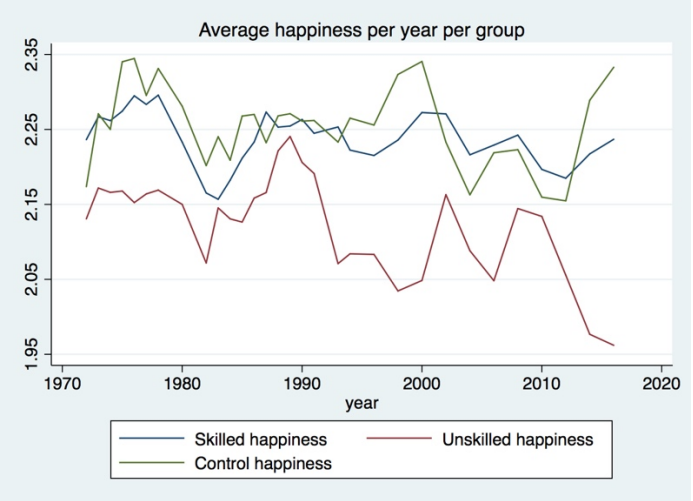


Figure 3 shows how exports and imports have been mainly increasing over the years 1972-2016. Dickey-Fuller tests point out that both exports and import*s* per capita are non-stationary (p-values >0.98). Differenced values of exports and imports per capita are stationary, indicating that export and import growth per capita are relatively steady over the years 1973 through 2016.

However, if the differenced Dickey-Fuller tests are performed for years 1990 and onwards, imports and exports per capita growth rates are not stationary, confirming that the Chinese trade effect is present. For both imports and exports per capita the p-value is 1.000.

Having showed that exports and imports are increasing over the years, the happiness of the low-skilled, high-skilled and control group will now be evaluated.

Figure 4



Average happiness levels per year for each socioeconomic group. A tssmooth (ma, window (2 1 1)) function is used to make the data more comprehensible.

Figure 4 shows the evolution of average happiness across all three categories. From the graph can be seen that there is a strong decline in happiness in the unskilled group in 1990-1993. They never seem to fully recover from this decline in happiness. The skilled and control groups do not seem to be affected by the Chinese trade shock. Further tests are performed below to analyze the evolution of happiness across groups.

Various Dickey-Fuller tests were performed on the evolution of happiness for each group. Results are summarized in *appendix D table 10*. The table shows that the evolution of happiness for all three groups is stationary at a 1% significance level. The differences in average happiness between the groups are also stationary at a 1% significance level. However, for years 1990 - 2016, the difference in average happiness level between the skilled and unskilled group is not stationary. Non stationarity is not rejected by a Dickey-Fuller test in this situation (p-value 0.81), again hinting at confirmation of the effects of the Chinese trade shock.

Causal Analysis

Following the previous descriptive analysis, the evaluation of the relationship between international trade and happiness will now be analyzed in a more causal manner. The difference in difference analyses as described in the methodology yields the following results.

Table 11: DID analysis of happiness

Variable	Coefficient	p-value
Treatment	-0.202	0.000
China Shock	-0.001	0.987
DID-estimator	-0.133	0.010

Observations: 8151

The results show that the Chinese export shock to the US economy has had a positive effect on the happiness gap between unskilled and skilled workers. Marginal effects analysis indicates that the DID-estimator lowers the number of people in the "very happy" category by 4.62%, confirming that the happiness gap between skilled and unskilled workers became larger after the Chinese trade shock.

Winners and losers: does the skilled group win and/or does the unskilled group lose?

The question remains whether the unskilled group loses and/or the skilled group wins as a result of the Chinese trade shock. It could be the case that only the unskilled group loses and that the skilled group is unaffected or vice versa. In both cases an enlarged happiness gap, as found above, would still be the result. Difference in difference analysis is performed with the use of the control group to evaluate the effect of the Chinese trade shock on the skilled and unskilled group separately. The results can be found in *table 12* and *13* on the next page.

Table 12: DID analysis unskilled vs. control

Variable	Coefficient	p-value
Treatment	-0.216	0.000
China Shock	0.009	0.856
DID-estimator	-0.141	0.021

Observations: 6094

Table 13: DID analysis skilled vs. control

Variable	Coefficient	p-value
Treatment	-0.016	0.740
China Shock	0.010	0.844
DID-estimator	-0.010	0.863

Observations: 6859

Table 12 shows that the Chinese trade shock has a significant impact on the difference in happiness between the unskilled and the control group. The unskilled group is relatively unhappier compared to the control group after the shock, in contrast to before the shock. This does not hold for the skilled group, because the coefficient of the DID-estimator is insignificant, which can be seen in *table 13*. These two tests combined indicate that the increase in the happiness gap between the skilled and the unskilled group is primarily the result of the unskilled group becoming less happy as a result of the Chinese trade shock. The happiness of the skilled group does not necessarily change.

Conclusion

For the first hypothesis the theoretical framework looked at the Easterlin paradox. This paradox states that GDP has a positive relationship with happiness of a nation in a cross sectional setting, but not in a time series (within-country) setting. This means that countries with a higher GDP per capita are on average happier than countries with a low GDP per capita. Veenhoven & Hagerty (2003) found that this positive relationship does hold in a time series setting. Easterlin (2005) critiqued them for using data from multiple sources, making results unreliable due to different framing effects.

This paper only uses the Eurobarometer data set for the analysis of the relationship, which solves the problem of inconsistent framing. The results for the first hypothesis are in line with Veenhoven & Hagerty (2003). The (lagged) coefficients of GDP per capita were positively significant for models with and without macro control variables. This means that GDP per capita has a positive relationship with happiness in a repeated cross sectional setting. The positive relationship of GDP per capita and happiness does become weaker as lags are added. GDP growth rates are also found to have a positive relationship with happiness. This finding is in line with the findings of Veenhoven & Hagerty (2003) and diverges from Easterlin's (1995) findings. The positive coefficients of GDP growth rates indicate that on average happiness increases as GDP within a country grows.

Based on the above, the first hypothesis is not rejected. GDP has a positive relationship with happiness in both a repeated cross sectional and time series setting.

In the second hypothesis of the theoretical framework it is hypothesized that increasing international trade should lead to an increase in happiness. Theoretical models, such as the Ricardian model and the Hecksher-Ohlin model, imply that increased openness to trade on average leads to improved allocation of production factors, resulting in increased economic growth. This is also confirmed in empirical research. However, Harrison (1996) shows concern about there being reverse causality present, meaning that increased economic growth could lead to increased international trade.

Increased economic growth has shown to have a positive impact on the happiness of a nation as is the result of the first hypothesis of this paper. In line with theoretical and empirical findings, increased levels of international trade should then also have a positive relationship with happiness. The analysis performed in this paper does not give a conclusive verdict on this hypothesis. When macroeconomic variables are not taken into account, (lagged) values of exports had significant positive coefficients indicating that countries with higher exports per capita are on average happier than countries with lower exports per capita. This relationship did not hold significantly for imports per capita. Growth rates of exports and imports showed opposite effects on happiness, although the current year coefficient found for exports was not significant. This would imply that growth of exports has a negative relationship with a country's wellbeing, whereas growth imports have a positive relationship with a country's wellbeing. This could have to do with the omission of net saving of a specific country. When a country is a net exporter and a net saver, it is in effect financing the consumption of another

country, meaning that the financing country has lower current consumption than it could have and the borrowing country has inflated current consumption. This discrepancy could have a significant impact on happiness.

When macroeconomic control variables are added to the export and import models the story changes substantially. All coefficients for (lagged) values of exports and imports per capita are negative. This is in line with the findings of Tella & MacCulloch (2008). Their paper finds a similar negative relationship between exports (% of GDP) and imports (% of GDP) with happiness. However, the coefficients of growth rates do not change sign, confirming what was found in previous models. Adding net saving rates and current account data to these models may solve this difference in sign between export and import growth rates. This subject is left for future research.

Based on the findings described above the second hypothesis is rejected for exports per capita. When macro economic control variables are added, all coefficients are negative. For imports the hypothesis is rejected in a repeated cross sectional setting, but not rejected in a time series setting.

For the third hypothesis, the relationship between increasing international trade and the divergence of happiness between socioeconomic groups in the US was evaluated. The theoretical framework pointed out that the Chinese trade shock could have a positive effect on the happiness gap between high-and-low-skilled workers. Autor et al. (2016) show that unemployment under low skilled workers rose due to increases in Chinese exports and their income went down. Tella et al (2003) find these two phenomena to have negative and positive respective effects on happiness. The difference in difference analysis performed in hypothesis 3 finds that the Chinese trade shock has indeed had a positive effect on the happiness gap between skilled and unskilled workers. Unskilled workers are worse off compared to highly skilled workers. Further difference in difference analysis indicated that only the unskilled group is affected by the Chinese trade shock. The skilled group is not necessarily better off in terms of happiness. This means that the increase in the happiness gap is primarily the result of the decreasing happiness of the unskilled worker group. Nevertheless, the happiness gap between the skilled and unskilled group did increase as a result of the Chinese trade shock.

As a result, the third hypothesis is not rejected. The happiness gap between highly skilled and low skilled workers became larger as a result of the Chinese export boom.

Answer to the research question

Exports and imports are found to have a negative relationship with the wellbeing of a nation in repeated cross sectional setting. Import growth has a positive relationship with the wellbeing of a nation. However, these effects are not universal across different socioeconomic groups within a population. Low skilled workers are negatively affected by import growth in terms of happiness. Skilled workers are not significantly affected by increases in imports.

Appendix

A. Bibliography

Autor, D., Dorn, D., & Hanson, G. (2016). The China Shock: Learning from Labor Market Adjustment to Large Changes in Trade. *IZA Discussion Papers*. doi:10.3386/w21906

Baier, S. L., & Bergstrand, J. H. (2005). Do Free Trade Agreements Actually Increase Members International Trade? *SSRN Electronic Journal*. doi:10.2139/ssrn.670982

Baldwin, R. E. (1992). Measurable Dynamic Gains from Trade. *Journal of Political Economy,100*(1), 162-174. doi:10.1086/261811

Ben-David, D. (1993). Equalizing Exchange: Trade Liberalization and Income Convergence. *The Quarterly Journal of Economics,108*(3), 653-679. doi:10.2307/2118404

Borjas, G. J., & Ramey, V. A. (1994). Time-Series Evidence on the Sources of Trends in Wage Inequality. *The American Economic Review,84*(2), 10-16.

Burtless, G. (1995). International Trade and the Rise in Earnings Inequality. *Journal of Economic Literature,33*(2), 800-816.

Dollar, D. (1992). Outward-Oriented Developing Economies Really Do Grow More Rapidly: Evidence from 95 LDCs, 1976-1985. *Economic Development and Cultural Change,40*(3), 523-544. doi:10.1086/451959

Easterlin, R. A. (1974). Does Economic Growth Improve the Human Lot? Some Empirical Evidence. *Nations and Households in Economic* Growth*,* 89-125. doi:10.1016/b978-0-12-205050-3.50008-7

Easterlin, R. A. (1995). Will raising the incomes of all increase the happiness of all? *Journal of Economic Behavior & Organization,27*(1), 35-47. doi:10.1016/0167-2681(95)00003-b

Frey, B. S., & Stutzer, A. (2002). What Can Economists Learn from Happiness Research? *Journal of Economic Literature,40*(2), 402-435. doi:10.1257/002205102320161320

Gould, D. M. (1998). Has NAFTA Changed North American Trade? *Federal Reserve Bank of Dallas: Economic Review*.

Hagerty, M.R. & Veenhoven, R. (2003). Wealth and Happiness Revisited – Growing National Income Does Go with Greater Happiness. *Social Indicators Research,64(1)*, 1-27. doi:10.1023/A:1024790530822

Harrison, A. (1995). Openness and Growth: A Time-Series, Cross-Country Analysis for Developing Countries. *Journal of Development Economics,48*(2), 419-447. doi:10.3386/w5221

Krugman, P. R., & Obstfeld, M. (2008). *International economics: theory and policy*. Beijing, China: Tsinghua University Press.

Li, H., Li, L., Wu, B., & Xiong, Y. (2012). The End of Cheap Chinese Labor. *The Journal of Economic Perspectives,25(4),* 57-74.

Lopez, R. A. (2005). Trade and Growth: Reconciling the Macroeconomic and Microeconomic Evidence. *Journal of Economic Surveys,19*(4), 623-648. doi:10.1111/j.0950-0804.2005.00264.x

Money can't buy happiness - or can it? (2010, November 30). Retrieved June 07, 2017, from http://www.economist.com/blogs/theworldin2011/2010/11/happiness_and_gdp

Robert F. Kennedy Speeches. (n.d.). Retrieved June 07, 2017, from https://www.jfklibrary.org/Research/Research-Aids/Ready-Reference/RFK-Speeches/Remarks-of-Robert-F-Kennedy-at-the-University-of-Kansas-March-18-1968.aspx

Tella, R. D., & Macculloch, R. (2008). Gross National Happiness as an Answer to the Easterlin Paradox? *SSRN Electronic Journal*. doi:10.2139/ssrn.707405

Tella, R., MacCulloch, R. J., & Oswald, A. J. (2003). The Macroeconomics of Happiness. *The Review of Economics and Statistics,85*(4), 809-827.

Veenhoven, R., & Hagerty, M. (2006). Rising Happiness in Nations 1946–2004: A Reply to Easterlin. *Social Indicators Research,79*(3), 421-436. doi:10.1007/s11205-005-5074-x

B. Discussion of data

Table 1: predicted proportions of happiness and true proportions of happiness

General Social Survey		
Happiness Categories	Predicted proportion	Actual proportion
"Not too happy"	12.68%	12.70%
"Pretty Happy"	55.97%	55.89%
"Very Happy"	31.35%	31.40%
Eurobarometer Survey Series		
Happiness Categories	Predicted proportion	Actual proportion
"Not at all satisfied"	4.40%	4.13%
“Not very satisfied”	14.01%	13.33%
“Fairly satisfied”	54.77%	55.04%
“Very satisfied”	26.82%	27.49%

Figure 1: Average Happiness in the United States per year (1972 - 2016)

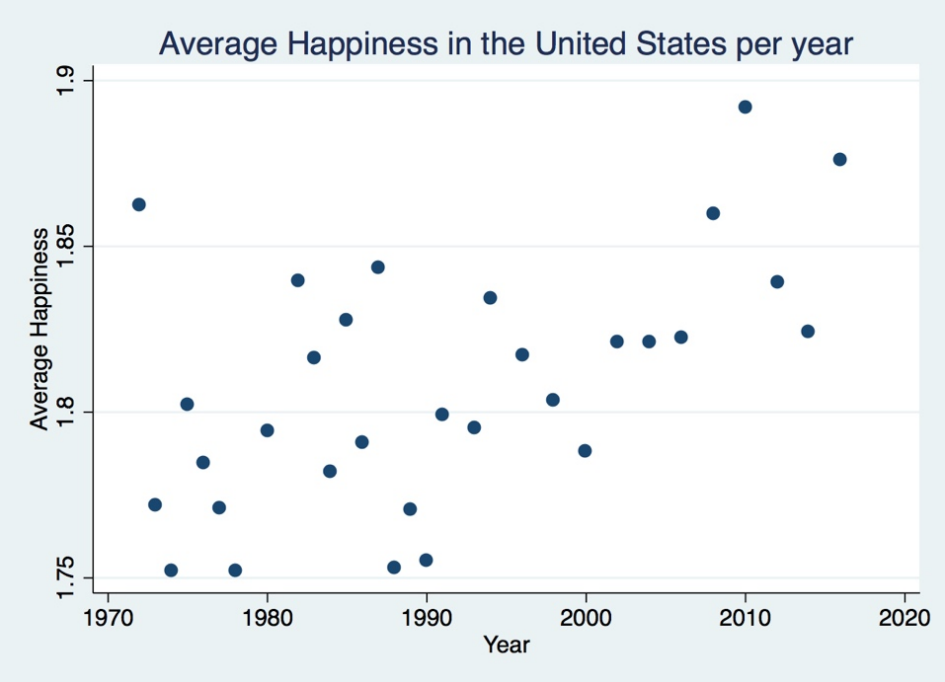


Table 2: variation of happiness between and within countries.

Variable		Mean	Std. Dev.	Minimum	Maximum	Observations
Average Happiness	overall	3.075265	0.2816186	2.428716	3.667501	N = 334
	between		0.2720254	2.622838	3.542738	n = 16
	within		0.0841115	2.823783	3.313076	T-bar = 20.875

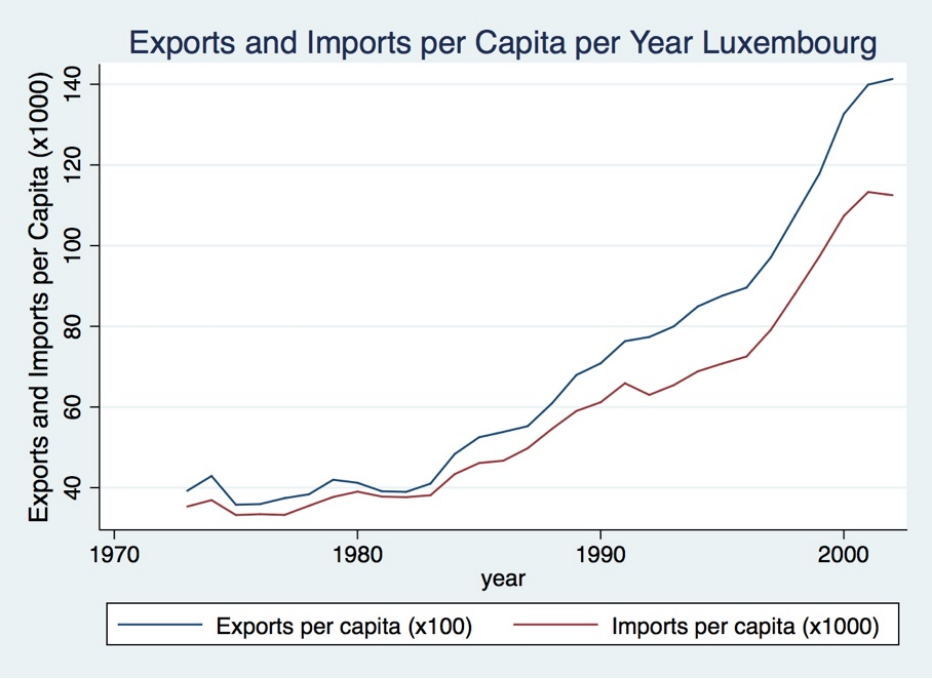
Table 3: Variation of happiness within countries per country

Country	Within Variation (Std. Dev.)	Minimum	Maximum
France	0.0722568	2.71013	2.985944
Belgium	0.1259242	2.899189	3.344964
Netherlands	0.0520257	3.250253	3.431594
Germany	0.0913889	2.73317	3.128562
Italy	0.1276991	2.517611	2.956166
Luxembourg	0.0624813	3.12605	3.411386
Denmark	0.0636974	3.420194	3.667501
Ireland	0.0993879	2.932595	3.421888
UK	0.0339156	3.067885	3.212928
Greece	0.1068764	2.43315	2.810568
Spain	0.0863979	2.78061	3.08129
Portugal	0.0863137	2.428716	2.751095
Norway	0.0654697	3.23008	3.412346
Finland	0.0307482	3.108549	3.186907
Sweden	0.0339069	3.291052	3.386158
Austria	0.0753964	3.061697	3.240443

Table 4: Descriptive statistics of macroeconomic variables.

Variable		Mean	Std. Dev.	Min	Max	Observations
GDP per capita	overall	18803.87	10645.08	3153.114	58709.02	N = 403
	between		5491.351	13676.93	29471.38	n = 17
	within		9127.026	-4558.405	49951.91	T-bar = 23.7059
Export	overall	2.54E+11	3.52E+11	8.74E+09	2.38E+12	N = 402
	between		2.12E+11	2.76E+10	8.77E+11	n = 17
	within		2.46E+11	-5.52E+11	1.75E+12	T-bar = 23.6471
Import	overall	2.76E+11	4.48E+11	1.19E+10	2.88E+12	N = 402
	between		2.63E+11	2.34E+10	1.12E+12	n = 17
	within		3.14E+11	-7.68E+11	2.04E+12	T-bar = 23.6471
Tax Revenue	overall	35.0879	6.603857	20.908	48.984	N = 402
	between		6.550681	25.49791	47.4415	n = 17
	within		2.721655	24.3341	42.8741	T-bar = 23.6471
Total Population	overall	51.80532	77.53044	0.35045	318.857	N = 401
	between		62.59287	0.385906	262.0176	n = 17
	within		11.37027	-0.3162821	108.6447	T-bar = 23.5882
CPI	overall	59.47994	22.08663	6.517618	110.067	N = 400
	between		12.27838	40.13794	86.19616	n = 17
	within		20.108	11.9508	102.8407	T-bar = 23.5294
GDP per hour worked	overall	72.55153	15.87275	24.76976	101.5534	N = 400
	between		9.04543	47.8983	87.47264	n = 17
	within		13.22536	47.96914	108.3924	T-bar = 23.5294

Figure 2: Exports and imports per capita (x1000) per year Luxembourg



C. Methodology – defining subgroups of the population

For the defining of the subgroups of the population the GSS variable *isco08* is used. This variable contains coded employment information in accordance with the Standard Classification of Occupations of 2008 (International Labour Office, 2008). Divisions into each category was done with the use of the following criteria:

1. **Skill level.** Highly skilled workers are allocated to the "positively affected" group and low skilled workers are allocated to the "negatively affected" group. The Standard Classification of Occupations of 2008 contains skill level for each subgroup on a scale of 1 to 4.

ISCO-08 major groups	Skill level
1 Managers	3 + 4
2 Professionals	4
3 Technicians and Associate Professionals	3
4 Clerical Support Workers	2
5 Services and Sales Workers	
6 Skilled Agricultural, Forestry and Fishery Workers	
7 Craft and Related Trades Workers	
8 Plant and Machine Operators, and Assemblers	
9 Elementary Occupations	1
0 Armed Forces Occupations	1 + 2 + 4

ISCO-08 skill level	ISCED-97 groups
4	6 Second stage of tertiary education (leading to an advanced research qualification) 5a First stage of tertiary education, 1st degree (medium duration)
3	5b First stage of tertiary education (short or medium duration)
2	4 Post-secondary, non-tertiary education 3 Upper secondary level of education 2 Lower secondary level of education
1	1 Primary level of education

Standard Classification of Occupation skill levels (International Labour Office, 2008)

   Observations with skill level 3 and 4 are considered highly skilled workers and workers with skill level 1 and 2 and considered low skilled workers.
2. **Globalization sensitivity.** Observations must in theory be able to be affected by increasing international trade. This means that low skilled workers must work in industries which are import sensitive and highly skilled workers must work in industries that export. This categorization is done in accordance with the definition given by Krugman and Obstfeld (2005).

Allocation based on the Standard Classification of Occupations of 2008 codes:

1. **Low skilled workers (minor groups):**
   810 Stationary Plant and Machine Operators
   811 Mining and Mineral Processing Plant Operators
   812 Metal Processing and Finishing Plant Operators
   813 Chemical and Photographic Products Plant and Machine Operators
   816 Food and Related Products Machine Operators
   817 Wood Processing and Papermaking Plant Operators
   818 Other Stationary Plant and Machine Operators

931 Mining and Construction Labourers
932 Manufacturing Labourers
933 Transport and Storage Labourers

2. Highly skilled workers (minor groups)

211 Physical and Earth Science Professionals
213 Life Science Professionals
214 Engineering Professionals (excluding Electrotechnology)
215 Electrotechnology Engineers
216 Architecs, Desingers, Surveyors and Planners
241 Finance Professionals
242 Administration Professionals
243 Sales, Marketing and Public Relations Professionals
251 Software and Applications Developers and Analysts
252 Database and Network Professionals
311 Physical and Engineering Science Technicians
312 Mining, Construction and Construction Supervisors
313 Process Control Technicians
314 Life Science Technicians and Related Associate Professionals
315 Ship and Aircraft Controllers and Technicians
351 Information and Communications Technology Operations and User Support Technicians
352 Telecommunications and Broadcasting Technicians

3. Control group (medical workers and teachers, minor groups)

221 Medical Doctors
222 Nursing and Midwifery Professionals
223 Traditional and Complementary Medicine Professionals
224 Paramedical Practitioners
225 Veterinarians
226 Other Health Professionals
231 University and Higher Education Teachers
232 Vocational Education Teachers
233 Secondary Education Teachers
234 Primary School and Early Childhood Teachers
235 Other Teaching Professionals
321 Medical and Pharmaceutical Technicians
322 Nursing and Midwifery Associate Professionals
323 Traditional and Complementary Medicine Associate Professionals
324 Veterinary Technicians and Assistants
325 Other Health Associate Professionals

D. Results

Table 5: Marginal effects GDP

Marginal Effects	Δ probability in %	p-value		Δ probability in %	p-value
No macro controls			**With macro controls**		
GDP/capita (steps of 10.000)			**GDP/capita (steps of 10.000)**		
"Not at all satisfied"	-0.720%	0	"Not at all satisfied"	1.104%	0
"Not very satisfied"	-1.316%	0	"Not very satisfied"	-2.030%	0
"Fairly satisfied"	-0.451%	0	"Fairly satisfied"	-0.695%	0
"Very Satisfied"	2.487%	0	"Very Satisfied"	3.828%	0
L1.GDP/capita (steps of 10.000)			**L1.GDP/capita (steps of 10.000)**		
"Not at all satisfied"	-0.672%	0	"Not at all satisfied"	-1.069%	0
"Not very satisfied"	-1.227%	0	"Not very satisfied"	-1.966%	0
"Fairly satisfied"	-0.420%	0	"Fairly satisfied"	-0.673%	0
"Very Satisfied"	2.319%	0	"Very Satisfied"	3.708%	0
L2.GDP/capita (steps of 10.000)			**L2.GDP/capita (steps of 10.000)**		
"Not at all satisfied"	-0.611%	0	"Not at all satisfied"	-1.029%	0
"Not very satisfied"	-1.125%	0	"Not very satisfied"	-1.900%	0
"Fairly satisfied"	-0.401%	0	"Fairly satisfied"	-0.664%	0
"Very Satisfied"	2.137%	0	"Very Satisfied"	3.593%	0
Δ GDP/capita (in %)			**Δ GDP/capita (in %)**		
"Not at all satisfied"	-0.062%	0	"Not at all satisfied"	-0.071%	0
"Not very satisfied"	-0.113%	0	"Not very satisfied"	-0.131%	0
"Fairly satisfied"	-0.039%	0	"Fairly satisfied"	-0.045%	0
"Very Satisfied"	0.213%	0	"Very Satisfied"	0.246%	0
L1.Δ GDP/capita (in %)			**L1.Δ GDP/capita (in %)**		
"Not at all satisfied"	-0.063%	0	"Not at all satisfied"	-0.075%	0
"Not very satisfied"	-0.117%	0	"Not very satisfied"	-0.138%	0
"Fairly satisfied"	-0.042%	0	"Fairly satisfied"	-0.048%	0
"Very Satisfied"	0.221%	0	"Very Satisfied"	0.262%	0

Without macroeconomic control variables on the left, with macroeconomic control variables on the right.

Table 6: Export models with macroeconomic control variables.

Model Number	one	two	three	four	five
Exports/capita (Δ=1.000)	-0.012***				
L1.Exports/capita (Δ=1.000)		-0.011***			
L2.Exports/capita (Δ=1.000)			-0.007***		
Δ Exports/capita (in %)				-0.001	
L1.Δ Exports/capita (in %)					-0.006***
GDP per capita (Δ=10.000)	0.543***				
L1.GDP/capita (Δ=10.000)		0.483***			
L2.GDP/capita(Δ=10.000)			0.353***		
Δ GDP/capita (in %)				0.010***	
L1.Δ GDP/capita (in %)					0.012***
Tax Revenue	0.012***	0.010***	0.010***	0.010***	0.011***
Inflation	-0.012***	-0.013***	-0.012***	-0.004***	-0.006***
Controlled for					
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Personal attributes	Yes	Yes	Yes	Yes	Yes
Number of observations	**412856**	**412856**	**409101**	**412856**	**409101**

** = significant at 10% level, ** = significant at 5% level, *** = significant at 1% level. All models predict* happiness *proportions within 1% accuracy.*

Table 7: Import models with macroeconomic control variables.

Model Number	six	seven	eight	nine	ten
Imports/capita (Δ=1.000)	-0.016***				
L1.Imports/capita (Δ=1.000)		-0.016***			
L2.Imports/capita (Δ=1.000)			-0.014***		
Δ Imports/capita (in %)				0.004***	
L1.Δ Imports/capita (in %)					0.001***
GDP per capita (Δ=10.000)	0.504***				
L1.GDP/capita (Δ=10.000)		0.489***			
L2.GDP/capita(Δ=10.000)			0.433***		
Δ GDP/capita (in %)				0.006***	
L1.Δ GDP/capita (in %)					0.008***
Tax Revenue	0.012***	0.011***	0.010***	0.011***	0.011***
Inflation	-0.012***	-0.013***	-0.013***	-0.004***	-0.005***
Controlled for					
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Personal attributes	Yes	Yes	Yes	Yes	Yes
Number of observations	**412856**	**412856**	**409101**	**412856**	**409101**

** = significant at 10% level, ** = significant at 5% level, *** = significant at 1% level. All models predict* happiness *proportions within 1% accuracy.*

Table 8: Marginal effects exports.

Marginal Effects	Δ probability in %	p-value		Δ probability in %	p-value
No macro controls			**Macro controls included**		
Exports/capita (Δ=1.000)			**Exports/capita (Δ=1.000)**		
"Not at all satisfied"	-0.008%	0	"Not at all satisfied"	0.104%	0
"Not very satisfied"	-0.015%	0	"Not very satisfied"	0.190%	0
"Fairly satisfied"	-0.005%	0	"Fairly satisfied"	0.064%	0
"Very Satisfied"	0.029%	0	"Very Satisfied"	-0.359%	0
L1.Exports/capita (Δ=1.000)			**L1.Exports/capita (Δ=1.000)**		
"Not at all satisfied"	-0.010%	0	"Not at all satisfied"	0.093%	0
"Not very satisfied"	-0.018%	0	"Not very satisfied"	0.170%	0
"Fairly satisfied"	-0.006%	0	"Fairly satisfied"	0.057%	0
"Very Satisfied"	0.035%	0	"Very Satisfied"	-0.321%	0
L2.Exports/capita (Δ=1.000)			**L2.Exports/capita (Δ=1.000)**		
"Not at all satisfied"	-0.012%	0	"Not at all satisfied"	0.060%	0
"Not very satisfied"	-0.023%	0	"Not very satisfied"	0.110%	0
"Fairly satisfied"	-0.008%	0	"Fairly satisfied"	0.039%	0
"Very Satisfied"	0.043%	0	"Very Satisfied"	-0.209%	0
Δ Exports/capita (in %)			**Δ Exports/capita (in %)**		
"Not at all satisfied"	0.004%	0	"Not at all satisfied"	0.010%	0.011
"Not very satisfied"	0.007%	0	"Not very satisfied"	0.019%	0.011
"Fairly satisfied"	0.003%	0	"Fairly satisfied"	0.006%	0.011
"Very Satisfied"	-0.014%	0	"Very Satisfied"	-0.036%	0.011
L1.Δ Exports/capita (in %)			**L1.Δ Exports/capita (in %)**		
"Not at all satisfied"	0.045%	0	"Not at all satisfied"	0.052%	0
"Not very satisfied"	0.083%	0	"Not very satisfied"	0.095%	0
"Fairly satisfied"	0.029%	0	"Fairly satisfied"	0.033%	0
"Very Satisfied"	-0.157%	0	"Very Satisfied"	-0.180%	0

Without macroeconomic control variables on the left, with macroeconomic control variables on the right.

Table 9: Marginal effects imports.

Marginal Effects	Δ probability in %	p-value	Marginal Effects	Δ probability in %	p-value
No macro controls			**Macro controls included**		
Imports/capita (Δ=1.000)			**Imports/capita (Δ=1.000)**		
"Not at all satisfied"	-0.006%	0	"Not at all satisfied"	0.135%	0
"Not very satisfied"	-0.011%	0	"Not very satisfied"	0.247%	0
"Fairly satisfied"	-0.004%	0	"Fairly satisfied"	0.083%	0
"Very Satisfied"	0.020%	0	"Very Satisfied"	-0.465%	0
L1.IMports/capita (Δ=1.000)			**L1.Imports/capita (Δ=1.000)**		
"Not at all satisfied"	-0.007%	0	"Not at all satisfied"	0.135%	0
"Not very satisfied"	-0.013%	0	"Not very satisfied"	0.246%	0
"Fairly satisfied"	-0.005%	0	"Fairly satisfied"	0.083%	0
"Very Satisfied"	0.026%	0	"Very Satisfied"	-0.464%	0
L2.Imports/capita (Δ=1.000)			**L2.Imports/capita (Δ=1.000)**		
"Not at all satisfied"	-0.008%	0	"Not at all satisfied"	0.117%	0
"Not very satisfied"	-0.015%	0	"Not very satisfied"	0.217%	0
"Fairly satisfied"	-0.005%	0	"Fairly satisfied"	0.076%	0
"Very Satisfied"	0.029%	0	"Very Satisfied"	-0.410%	0
Δ Imports/capita (in %)			**Δ Imports/capita (in %)**		
"Not at all satisfied"	-0.042%	0	"Not at all satisfied"	-0.033%	0
"Not very satisfied"	-0.077%	0	"Not very satisfied"	-0.060%	0
"Fairly satisfied"	-0.026%	0	"Fairly satisfied"	-0.020%	0
"Very Satisfied"	0.146%	0	"Very Satisfied"	0.113%	0
L1.ΔImports/capita (in %)			**L1.ΔImports/capita (in %)**		
"Not at all satisfied"	-0.021%	0	"Not at all satisfied"	-0.012%	0
"Not very satisfied"	-0.038%	0	"Not very satisfied"	-0.022%	0
"Fairly satisfied"	-0.014%	0	"Fairly satisfied"	-0.008%	0
"Very Satisfied"	0.073%	0	"Very Satisfied"	0.041%	0

Without macroeconomic control variables on the left, with macroeconomic control variables on the right.

Table 10: Dickey fuller tests for stationarity.

Tested Dickey-Fuller	Stationary	MacKinnon approximate p-value
Difference Skilled - Unskilled	Yes	0.0014
Difference Skilled - Control	Yes	0.0000
Difference Unskilled - Control	Yes	0.0002
Skilled	Yes	0.0134
Unskilled	Yes	0.0345
Control	Yes	0.0000