International trade flows across the Business cycle

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Abstract:

By using OLS-type regressions on monthly import data between 2004 and 2009 from four major European economies, this thesis will analyze the determinants of international trade flows, based on cross-country differences and changes within countries. Additionally, the behavior of international trade flows over different stages of the business cycle depending on the wage level and the risk profile of countries will be analyzed.

Results show that lower wage levels and higher risk ratings (lower actual risks) are generally beneficial to the share of trade that countries manage to capture. Further results show that international trade goes together with higher wages within countries, independently from the business cycle, but that the business cycle does affect the valuation of risks, because countries with lower risk ratings (higher actual risks) capture lower trade shares during a contraction period of the economy.

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1. Introduction

Since 1985 international trade has grown explosively and has become more important in almost every country in the world. Although international trade has grown in almost every country, the growth has not been equal among countries.

This raises the question what determines international trade flows, and why some countries have done much better than others. This is very relevant for governments, since it is generally accepted that there exists a positive effect of international trade on economic growth.

The ability of countries to attract international trade and investment has become an important issue for both researchers and governments, because it is crucial for economic development of countries.

To gain more insight on the issue, in this thesis I will identify a number of determinants for international trade flows, by explaining the share of international trade that countries manage to capture using OLS-type regressions. Both cross-country differences as well as changes within countries are used in this analysis.

Additionally, I will also identify changes of two specific determinants of international trade over the different stages of the business cycle. These two determinants are country specific risks and wage levels, which are interacted with a variable representing the business cycle stage, in order to identify changes in the valuation of these determinants over the different business cycle stages. Differences in country characteristics could lead to differences in the gains or losses in international trade over changes in the business cycle. Identifying such effects is the main target of this thesis.

Past research on the subject has often used different variations of the Hekscher-Ohlin models to explain the direction of trade patterns between countries, while this thesis has its focus on the share of international trade that countries manage to capture. Another difference to other papers on the subject is the data. Other literature has usually studied periods of over 10 year with yearly data. This thesis however will use very recent monthly import data from four EU countries over a 5-year period. This allows for a detailed view of changes in trade determinants and for a proper identification of different business cycle stages.

I will start this thesis with a review of literature on international trade patterns, trade determinants and the business cycle separately, followed by a part which discusses the possible interaction between both subjects. Next we will discuss the data and setup, the empirical results, followed by the conclusions of the thesis.

2. International Trade

2.1 Reasons for International trade

When trying to explain trade flows between countries, it is critical to understand why there is trade between countries at all. If all goods would be available in every country at the same price, trade would not be useful in any way. So there needs to be either a difference in prices of goods between countries, or a difference in availability of goods in order to make international trade useful.

One of the earlier and best known theories explaining international trade patterns is the theory of comparative advantage by Ricardo. This theory explains that relative prices of goods determine trade flows. Ricardo demonstrates that countries can still trade when one country is most efficient in producing all goods, because the less efficient country might be "less bad" in one good, which makes them able to compete in terms of relative prices. This will make each country specialize in the good in which it is relatively most efficient, while both trading a share of its production with the other country. Because trade allows the countries to specialize, there is an efficiency gain which leaves both countries better off.

One of the most important and influential model that is used to explain trade patterns is the Hekscher-Ohlin model. In this model, advantages in producing a specific product usually arise from differences in endowments of labor, capital and technology. These differences in endowments lead to different prices for products and factor prices in autarky, which are equalized by international trade. The products that are expected to have a relative advantage and to become exported products are the ones that mostly use the abundant production factor, while the products using the scarce production factor are expected to be disadvantaged and are more likely to be imported.

A good example is shown by a paper using a modified, Hekscher-Ohlin-Vanek model (Cörvers & de Grip, 1997). The authors try to explain international trade patterns between

industrialized countries by differences in human capital endowments. They use the shares of low-skilled, intermediate-skilled and highly-skilled labor in the total working force, as well as the share of the working force engaging in Research & Development activities to explain trade patterns between countries.

They find a significant positive impact of the share of high-skilled workers and technical knowledge on the comparative advantage of technology-intensive sectors. As expected, a negative impact is found on labor-intensive shares. The low-skilled share shows mixed results across different sectors, while the share of intermediate-skilled workers shows relevance in only one sector.

The results show a possible explanation for trade patterns between countries with different levels of technology, different labor endowments and education levels.

Another possible cause of trade is a difference in the availability of goods across countries. There are many cases of trade where countries are simply unable to create specific products themselves, or only at very high costs. Good examples can be found in natural resources; in many cases, a few countries have large quantities available, while others have very little, or none.

Still, even in the case where countries both have access to similar goods at a similar price, trade can occur. It does because consumers like to have a choice out of multiple similar goods, for example, different brands of DVD-players or different tastes of tea. This phenomenon is called "love of variety" and will be further analyzed in section 2.3.

2.2 International Trade and Foreign Direct Investment

International trade is not something just taking place between local firms from different countries but knows many dimensions. Multinational firms account for a large amount of international trade, and they trade internationally both within their own firm as well as with other firms. Production locations are not just chosen to supply the local market, but often supply continents or the whole world with a specific product.

When a firm decides to invest in a production location outside its home country, this is called Foreign Direct Investment (FDI). One scenario is that the production location replaces one in the home country, or is meant to produce a new good. In this case it is very likely that the production location will cause trade between countries, because the products are likely to be

(partially) sold abroad or used as intermediate goods abroad. This is mostly the case for vertically integrated multinationals, which create a chain of products and produce different stages of the product chain in multiple countries. Another scenario is that this new production location will be an additional plant which replaces the current trade between countries in order to lower transport costs. This would usually be the case with horizontal multinationals, which expand their current activities over different countries. Horizontal multinational firms are more likely to arise and become larger relative to international trade when transport cost, trade barriers and firm-level scale economies are high relative to plant-level scale economies. (Markusen, 2002)

This is essentially the core of the discussion whether international trade and FDI are complements or substitutes of each other, or which of the two is dominant. In the last decade, empirical evidence has mostly pointed towards a complementary relation between international trade and FDI (Fontagné, 1999). This implies that increasing FDI towards a country is likely to lead to more international trade. This makes the FDI decisions by multinational firms very important for international trade patterns, and shows that FDI and international trade are closely related. Therefore, arguments from FDI literature can be very relevant for international trade matters.

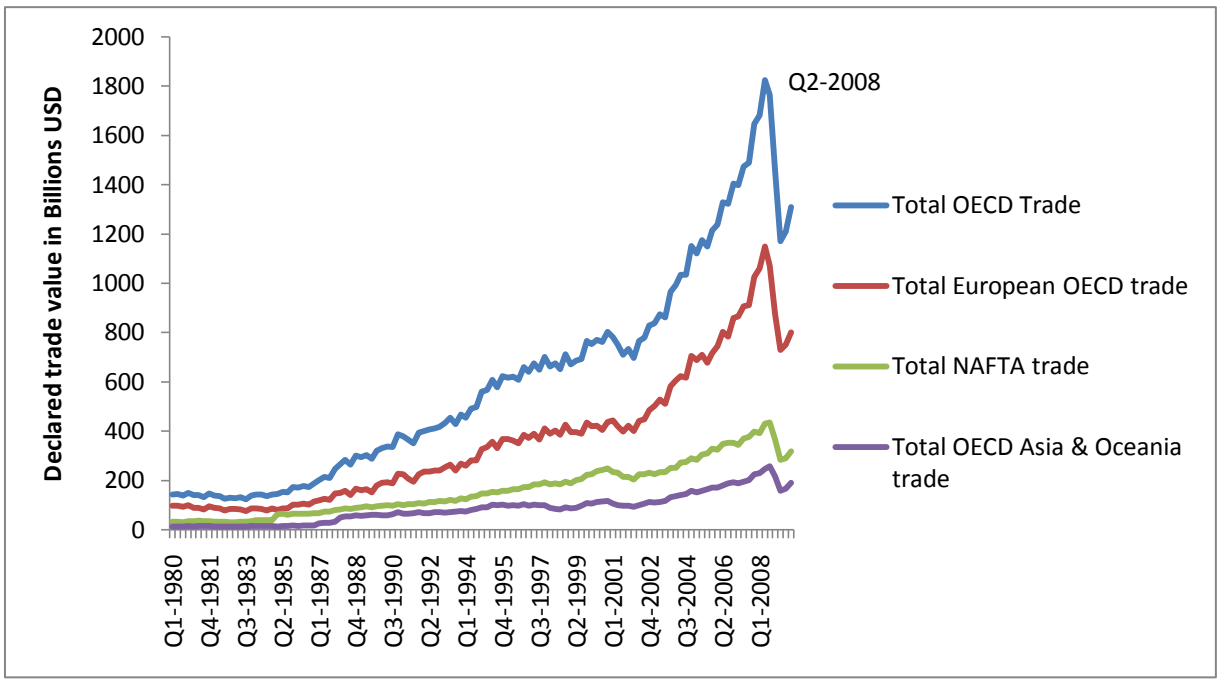
2.3 History & Results from international trade

Now that we have discussed the origin of international trade, we can look at the development of international trade over recent decades and look at the welfare effects of these developments.

International trade has grown rapidly since 1985. Until the recent economic crisis there has been little but quick growth in international trade. Both developed as developing countries have seen massive growth in their trade accounts.

Figure 1 shows the total trade (imports + exports) for developed countries that are members of OECD. It shows an enormous growth in trade since 1985 without any large drops until the second quarter of 2008. Before this large fall, coinciding with the most recent economic crisis, there were only a few small corrections, the biggest of which was in the early 2000's. But this drop was very small compared to the drop in 2008.

Figure 1

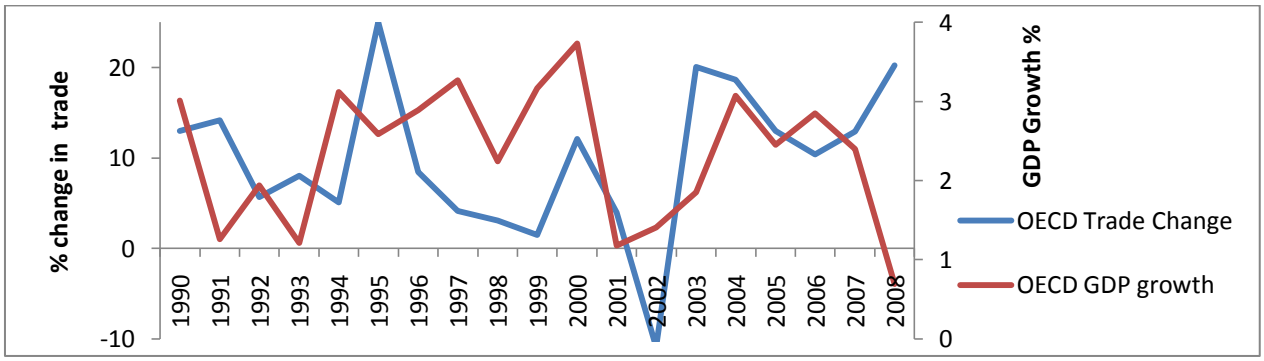


Source: OECD.Stat online database

When we take a look at the growth of total OECD trade compared to the average real GDP growth in OECD countries in figure 2, it is obvious that international trade grew much faster than GDP. As already obvious from Figure 1, international trade has mostly shown high annual growth figures . The average annual growth of international trade from 1990 up to 2008 is just short of 10%. For real GDP growth it has been 2,3%.

Also interesting is the high volatility of international trade compared to GDP growth as visible in figure 2. High annual GDP growth usually coincided with high trade growth, while international trade growth has mostly been low, or even negative, in years of low GDP growth.

Figure 2



Trade data Source: OECD.Stat online database GDP Growth data: World Development Indicators

Currently, there is a strong consensus on a positive relation between international trade and economic growth. Looking back at the reasons for international trade discussed in section 2.1, we might be able to identify some welfare effects from international trade.

Specialization

A clear potential gain from international trade is the gain from specialization by countries, which is predicted by several different economic models. I already discussed Ricardo, which predicts specialization due to differences in productivity, as well as the Hekscher-Ohlin model, which results in some degree of specialization due to different factor endowments. Another popular model predicting specialization due to international trade was constructed by Ethier (1979) who translates Adam Smith's theory on the division of labor to international trade and argues that the degree of specialization is dependent on the world market instead of on the domestic market. A larger world market due to trade liberalization, removal of trade barriers or lower transport costs among other things, should therefore lead to higher specialization. The observable increase in globalization of the recent decades should have lead to an increase in specialization.

The actual existence of this specialization and the gains of this specialization is subject of discussion in recent literature. Schott (2004) demonstrates that products specialization does not appear across products, but is present within products. Similar evidence comes from Hummels et al. (2001) who shows a 30% growth of vertical (within good) specialization between 1970 and 1990.

There is no agreement on the actual welfare effects of specialization, these welfare effects are mostly discussed in theoretical papers. E.g. Arndt (2004) demonstrates that specialization increases welfare by raising industry efficiency, while Eckel (2003) also finds that specialization can have efficiency effects but adds that there is a significant chance that specialization leads to distortion of factor allocation, which can lead to lower efficiency and a loss of welfare.

Empirical papers on the subject are harder to find, the only one I found (McDonald & Milner, 1994) finds that 3.01% less resources were required in order to meet final demand in the UK in 1979 due to international trade, while 0,74% less input weas required in 1984 in order to meet final demand. These results show a real efficiency gain which raises welfare by saving resources for other uses.

Increase in varieties

An additional reason for international trade already mentioned in section 2.1 is the demand for multiple varieties of similar products which can be satisfied by foreign products. A form of *"love of variety"* is often used in models on international trade, the actual size and the welfare effects of this phenomenon is still under discussion.

An early model allowing for product variety was introduced by Krugman (1979), who constructed a model in which product varieties grow proportionally with the home market's growth. This would result in larger economies exporting more varieties. Ardelean (2007) finds this in contrast with empirical data and reports a lower growth in varieties and estimates a lower *love of variety* by consumers. This means that the gains from trading more varieties are lower as well, depending on the estimate of the strength of *love of variety*.

Estimates on the actual welfare gain from trading varieties differ strongly across different studies. Earlier work from Romer (1994) shows that a tariff increase of 10% can lead to a large loss in GDP of up to 20%. The reason is that it is not just the quantity of each variety imported that is lowered, but there is also a chance of varieties disappearing from the market completely, leading to a larger loss of welfare, since the choice is lost. Broda & Weinstein (2006) calculate a 2,6% welfare gain for the US between 1972 and 2001 due to a large growth in imported varieties. A very recent paper (Ardelean & Lugovskyy, 2010) acknowledges the positive welfare effect from varieties, but shows that the effect in the papers mentioned above is overstated, due to a lack of dynamics and substitution between domestic and foreign varieties in their models. So, although the size of the effect is still under discussion, there is a clear consensus on the existence of a positive effect from imported varieties and welfare.

Factor prices

An additional result of international trade in a Hekscher-Ohlin framework is a change in factor rewards. The result of international trade in this model is the equalization of factor rewards across countries, independent from factor mobility. This is usually called factor price equalization (FPE).

International trade allows countries to exploit their production factor which is abundant relative to other countries. This raises the price of this factor compared to a state of autarky up to the point where it is equal to the price in the other countries. The opposite is true for the scarce factor, due to international trade, this factor now faces competition from foreign

countries which will force the price down until the prices are equal. The raise in the price of the abundant factor and the decline in the reward of the scarce factor is described by the Stolper-Samuelson theorem, which it is called because Stolper and Samuelson were the first to derive this result from the Hekscher-Ohlin framework.

The actual existence of the Stolper-Samuelson effect is another highly debated topic which often occurs in discussions whether or not globalization helps poor countries due to its possible effects on wages of unskilled labor. Many papers are unable to find evidence of the existence of the Stolper-Samuelson effect or find results in the opposite direction. Examples of papers that are inconclusive or show opposing effects of globalization on wages in labor abundant countries are Pavcnik et al. (2004), Feliciano (2001) and Goldberg & Pavcnik (2005). On the other hand, several other papers like Robertson (2004), Chiquiar (2004) and Kumar & Mishra (2008) do find support for the Stolper-Samuelson theorem in empirical data.

If we look at empirical papers studying the total relation between international trade on and economic growth, we find more support for the positive relation between international trade and economic growth in general, although there is some discussion on the robustness of the results in these papers.

One paper that finds a very positive relation between international trade and economic growth is the paper "Trade and Growth: An empirical investigation" (Frankel & Romer, 1996). This paper uses the gravity model to predict trade between countries. The gravity model was found most suitable because other variables that could explain cross country trade are likely to be correlated with variables included in the income function.

Then using the income function, the authors try to explain the effect of trade on income. All of their regressions show a positive effect of trade on growth. They find that trade increases growth by stimulating factor accumulation as well as by raising output at a constant factor accumulation level. The actual effect of trade on income they find differs across their regressions. The effect of a 1% increase in both imports and exports on income ranges from 1,7% up to well over 2%.

In a later paper (Frankel & Rose, 2000) the estimate of the positive effect is lower. The estimation suggest that 1% increase in trade relative to GDP, leads to an increase in income per capita of 0,33% over a period of 20 years. The authors also estimate that introducing a

common currency increases the volume of trade between members of the currency union more than threefold.

Another famous paper on the subject is that of Dollar & Kraay (2001), which describes the relation between international trade openness, economic growth and poverty reduction for developing countries after 1980. Dollar and Kraay use the proportion of trade in GDP as proxy for trade openness to explain the growth rate of different countries, controlling for a number of other policy measures and endogeneity within their instruments.

Dollar and Kraay divide the developing countries in two groups, *globalizers* and *non-globalizers*. They show that the globalizing group has had far higher growth rates from the 1970's up to the 1990's. Since the 1990's, the globalizing developing countries have also outperformed the developed countries in terms of economic growth, which implies they have been catching up with the developed countries.

Next they also make a number of comparisons between countries that are much alike, except their openness to trade. In each pair, the more open country has experienced higher growth rates.

In their regressions they avoid the problem of endogeneity in their variables by trying to explain within-country differences instead of using cross-country differences, as was done in earlier papers. Specifically they examine if changes in average growth rates can be explained by changes in trade volumes. Doing this they find a very strong correlation between growth in trade and economic growth. Two different regressions yield significant results of 0.252 and 0.475, which can be interpreted as follows: A 100% increase in trade over a decade will lead to a cumulative growth in GDP of 25.2%, or 47,5%.

It is noteworthy to mention the method suffers from high multicollinearity. This is a problem for isolating specific effects, and in this case specifically, the effect of trade. Therefore the authors note that, although there is very strong evidence, they are ultimately unable to scientifically prove the effects of trade on growth, as was noted in past criticism on papers on the subject by Rodriguez & Rodrik (2001) and to a lesser degree by Bhagwati & Srinivasan (2002)

In response to this critique, Dreher (2006) uses a different approach, by constructing an index of globalization for 114 countries. This overall index consist of three parts: economic integration, social integration and political integration. The results show a positive relation

between the overall globalization index and economic growth. More detailed results show that this economic growth originates mainly from economic integration and cross-border information flows. The economic integration index consist out of a number of trade- and investment-related statistics, like actual trade and investment flows, but also out of trade policy measures like tariffs, import barriers and capital account restrictions. For this reason it is impossible to account the positive effect from the economic integration index completely to international trade, but at least it is very likely that international trade accounts to a large extent for it.

Although acknowledging positive effects of international trade on economic growth for developed countries, Dowrick & Golley (2004) found that developing countries might not profit from international trade as much as developed countries do. The authors found that developing countries gained from trade in the 1960's and 1970's, but show demonstrate that since the 1980's most of the gain from trade has been for developed countries, while developing countries have gained little from it since 1980.

In contrast to these results, research on the effects of lowered US trade barriers for developing countries shows that increased market access and expanding trade volumes spurred economic growth in developing countries between 1970 and 2000. Estimations show that complete removal of trade barriers against developing countries in developed countries would increase growth annually by something between 0.6 to 1.6 percent, as a result of increasing trade. (Romalis, 2007)

So, although the robustness of the results of some papers has been questioned, the evidence in the literature largely points towards a positive relation between international trade and economic growth. This makes the question what determines trade flows very relevant for any country wishing to promote economic growth and fight poverty.

2.4 Model limitations

Earlier in the thesis, I discussed the Hekscher-Ohlin-Vanek (HOV) model, which is a variation of the well-known and often used Hekscher-Ohlin model. Although the HOV model is very useful for theoretical applications, it has a number of assumptions which do not seem to be realistic in the real world.

The assumptions of the HOV model are (Leamer, 1980):

- identical factor productivity (technology) in all countries,
- identical homothetic utility functions for all consumers.
- constant returns to scale in all production functions,
- no transportation costs and no other impediments to trade,
- perfect competition in the markets for goods and factors,
- immobility of production factors between countries, but complete mobility of production factors between sectors within a country,
- factor-price equalization between countries,
- equal numbers of factors and goods,

At first sight it seems none of these assumptions hold true in the real world. Some assumptions are for modeling convenience only and are unlikely to have large influence on the results, though others, like zero transportation costs and the absence of other trade impediments, are likely to have influence on trade decisions.

Transport costs & productivity

A more recent paper (Gourdon, 2006) addresses this issue and relaxes a number of these assumptions by extending the HOV model. This paper relaxes four assumptions:

- identical factor productivity (technology) in all countries,
- identical homothetic utility functions for all consumers.
- constant returns to scale in all production functions,
- no transportation costs and no other trade impediments,

The results indicate that the factor endowments are still important for trade patterns and specialization and also that their role has not diminished over time. In addition, he finds that adding new determinants can improve the quality of the model's predictions.

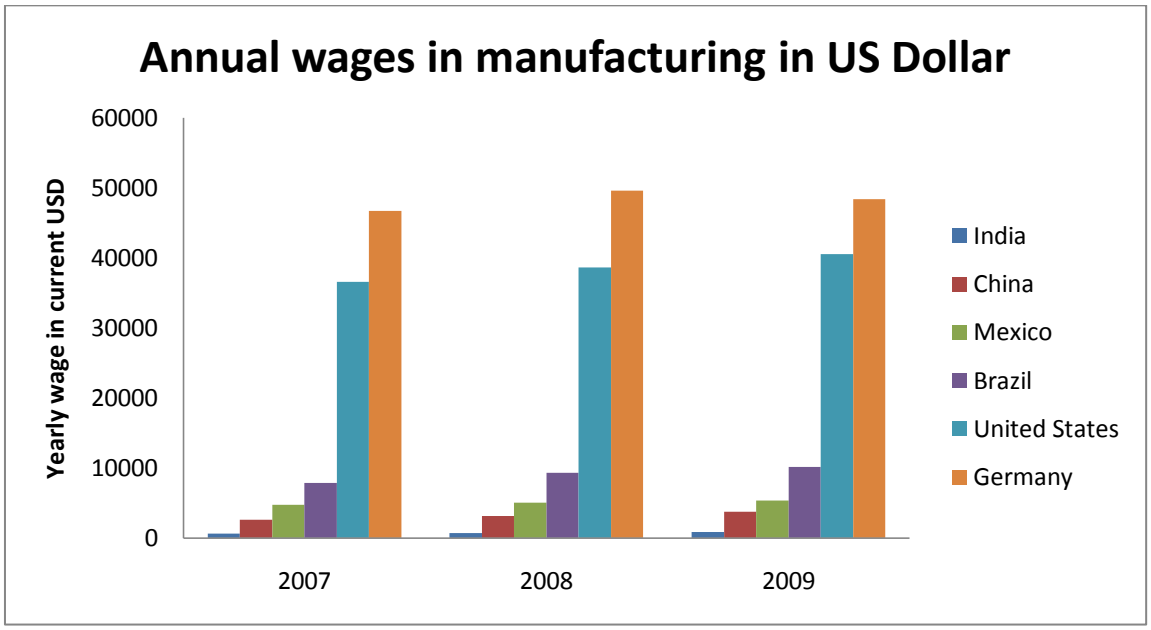
Allowing for differences in factor productivity increases the chances of countries to be a net exporter of manufactured goods and food products. Furthermore, trade is also significantly sensitive to transport costs and scale effects.

Wages

Although the model is improved over the original HOV model, it still uses some of the original assumptions. The equalization of factor prices implies that both the price for capital and for labor (wage) should be equal in all countries engaging in trade.

When we look at wages around the world we can see a clear difference. Figure 3 shows the annual wage earned in manufacturing. It shows there is an vast difference in the annual wage earned in the same sector across various countries.

Figure 3



Source: Business Monitor Online / ILO

The figure is limited though, because it compares the annual wage, without taking into account the number of hours worked and non-wage benefits. But it is reasonable to expect that this will only increase the differences in wage costs more, because working conditions and non-wage benefits are usually better in developed countries compared to developing countries.

Of course, it is also likely that there is are differences in productivity, due to education or the endowment of capital. But it is unlikely that they completely make up the enormous differences in yearly wages in the case of relatively simple jobs.

Earlier literature supports this statement by concluding that *"factor price equalization is widely at odds with wage data"* (Trefler, 1993). Considering the large wage differentials between countries, there could be an incentive for firms to seek the countries with the lowest labor costs.

Further support is found in several European papers which find that wage changes drive job relocation. European empirical research (Konings & Murphy, 2001) finds that EU multinational enterprises substitute jobs in the parent country for jobs in foreign country. The effect of a 10% decrease in labor costs in an EU subsidiary causes a decrease of 2,3% in parent country employment in the manufacturing sector. The effect is only found in the EU though, and not in Central- and East-European countries. The authors suggest this could be due to the low trade barriers and transport cost within EU countries.

A conclusion from research by Galgóczi, Keune & Watt (2006) is that, although the wage gap between EU-15 countries and new EU member states is diminishing, it remains sizeable and will remain an important driver for international relocation in the foreseeable future.

Similar evidence comes from literature on Foreign Direct Investment (FDI). Braconier, Norback & Urban (2005) find that countries with lower wage levels tend to have higher multinational enterprise activity, which indicates that such countries are interesting for investment. One of the conclusions from Mejean & Patureau (2010) is that a firm's location decision has a negative cost effect included and that a higher minimum wage decreases the attractiveness of a country for investment.

Altogether there is a large amount of evidence that factor price equalization is not achieved in the real world and that differences in wages are possibly an important driver for international trade and investment flows. This is why I came to the following hypothesis which will be tested in section 5.2:

Hypothesis 1: Countries with lower wages will capture a higher share of international trade.

Trade impediments & risks

The assumption of the Hekscher-Ohlin model that transport costs and other trade impediments are not present was already discussed earlier in the thesis. As mentioned before, Gourdon (2006) demonstrated that international trade is sensitive to transport costs, but "no other trade impediments" leaves quite some room for other impediments to trade, unrelated to transport costs.

There are many other possible trade impediments, the clearest examples are tariffs and non-tariff trade barriers put up by countries. These impediments are only slightly relevant for this thesis. Because all four home countries used in this research are located within the EU, the home countries in this research are all in the same customs union. Tariff and non-tariff barriers are equal to all countries outside this customs union. But since a number of partner countries is also within the same customs union, we can identify the differences between countries within the same customs union on the one hand and countries outside it on the other. But there are a large number of other potential trade impediments though. Examples are exchange rate risks, low quality of institutions, lack of proper laws or insufficient enforcement of the law.

Exchange rate risks

In the past section (2.3) I already pointed out the Frankel & Rose (2000) which demonstrate a positive effect from of a common currency on international trade. But relatively few countries are members of a currency union, leaving room for changes in exchange rates and exchange rate risk. There is a large amount of literature on the relation between exchange rate variability and the volume of international trade, although without consensus on the issue. Generally, it turns out difficult to find a significant relationship, though some authors manage to do so. Examples of papers finding a significant negative relation between exchange rate variability and international trade are Cheong (2004) and Amann & Römmich (1999).

Klaassen (2004) explains that it is hard to identify the relationship because export decisions are mostly affected by the expectations of the exchange rate one year ahead. Because this is a fairly long term, the exchange rate over this complete period is likely to be relatively constant, apart from short-term fluctuations. This will make it hard to find the effect of exchange rate risk on international trade. Eisenschmidt and Wälde (2007) argue that a negative relation between exchange rate variability and international trade is possible because relatively few imports are covered by forward contracts. In spite of the large amount of available literature, there is no consensus whether international trade decisions are affected by exchange rate variations.

Institutions & risk

Another potential trade impediment is the lack of proper institutions and proper governance. The enforcement of property rights and the rule of law are crucial for investment; firms will be less likely to invest when high risks are involved. Research on the importance of proper institutional quality shows that good institutional quality and high trade go hand in hand with long-term economic growth, although identifying the relative importance of both variables is far from easy. (Dollar & Kraay, 2003). Another interesting approach used by Levchenko (2007), which models institutional quality as an incomplete contract, because imperfect institutions are similar to contracting imperfections. The results demonstrate that institutional quality is a vital factor for international trade. Additionally, there is evidence that the institutional characteristics of countries matter for FDI decisions by US firms. (Nicolini, 2007) The results of this paper show strong evidence that higher institutional quality positively affects FDI inflow for the intermediate goods sector.

Altogether this provides us with quite some evidence that the quality of institutions, or more generally, the risks incurred in a country, are important for international trade decisions.

Hypothesis 2: Countries with higher risk ratings (= lower actual risk) will capture a larger share of international trade.

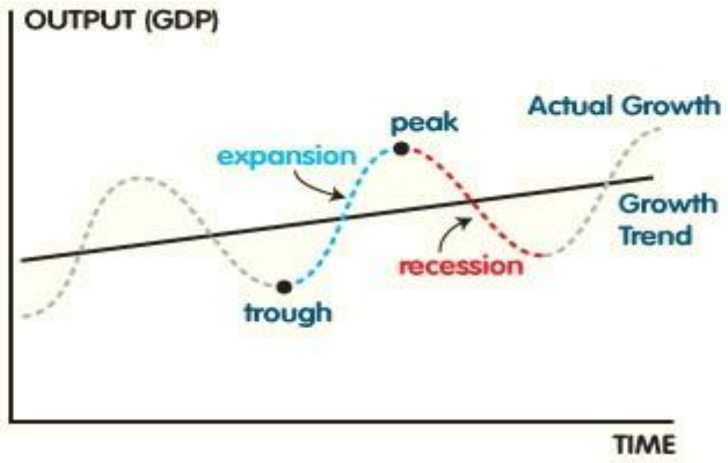
In addition to the two hypotheses I discussed other variables that are likely to have an effect on international trade shares. In order to correct for these effects I will include additional control variables, which are explained in section 5.1.

3. The Business Cycle

In the long-run, economies are assumed to have a fairly stable economic growth rate. Although subject to adjustment, this so-called trend rate, should be quite stable over longer periods. In the short-run, strong deviations, either upward or downward from the trend rate occur. Economic boons and recessions (or even depressions) follow up to one another, sometimes resulting in growth figures far from the trend rate.

These deviations are explained by business cycle theory, in which the economy behaves according to a specific pattern. In the business cycle theory, economic expansions and contractions follow up one another over time. Figure 4 shows how this is usually visualized:

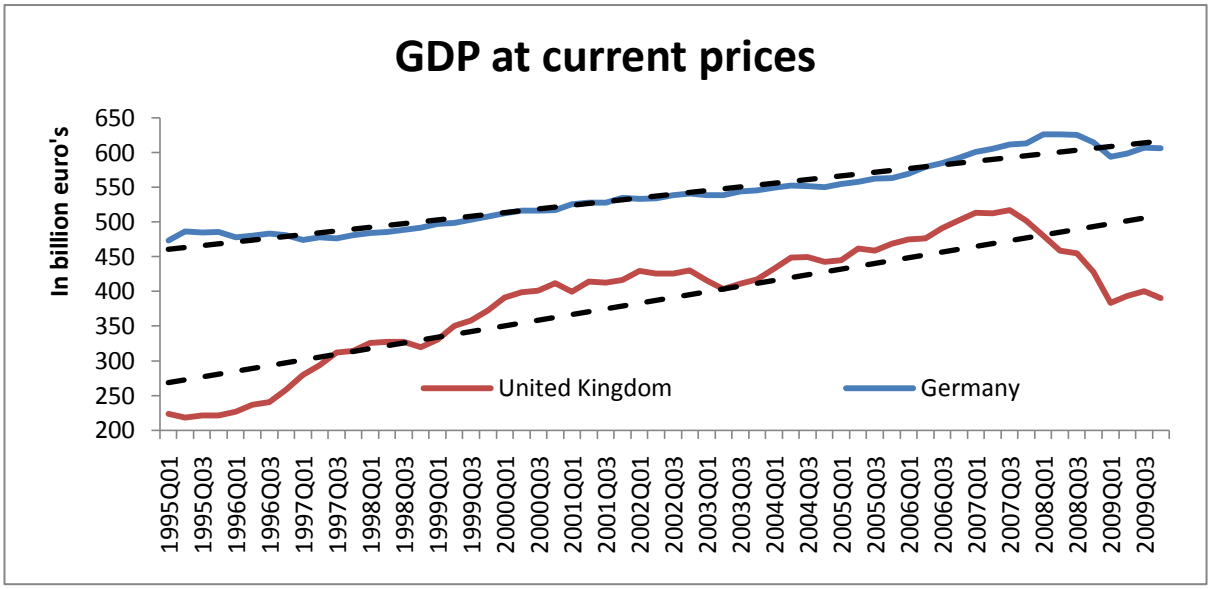
Figure 4



Source: http://sparkcharts.sparknotes.com/economics/macroeconomics/section4.php

Although something similar is to be observed when looking at GDP levels in most countries, the actual cycles are not as even and pretty as shown in the figure 4. If we look at the GDP level two major EU countries from 1995 until 2009 in figure 5 we see a similar pattern.

Figure 5



Source: Eurostat Online database. Gross Domestic Product at market prices, not seasonally adjusted.
http://epp.eurostat.ec.europa.eu/portal/page/portal/national_accounts/introduction

Both countries show deviations from the trend line over time, although they do not always occur at the same point of time, or in the same direction. This view finds support from Krolzig (2001), who uses several statistical tools to identify shifts in the business cycle. The results show that business cycles do not occur equal all over the world, and have not occured equal even in Europe, although convergence of business cycles is found there. The expansion and contraction stages do not need to be of equal length, Krolzig shows that in the period 1960-2000, the expansion stages usually were longer. This view is confirmed by NBER[1]; their data shows that in the post World-war 2 period in the United States, the expansion states have been much longer than the contraction states.

These cycles have a large influence on other factors in the economy. It is interesting to study these factors because they can influence international trade flows, either through actual changes in factors or trough different valuation of factors due to a change in the business cycle state. One example is risk: a country can become more or less risky in a specific business cycle stage, but it is also possible that the actual risk remains equal, but is being valued differently by economic agents.

[1] National Bureau of Economic Research: http://www.nber.org/cycles.html

This puts relevancy on indicators with a relationship with the stage of the business cycle; some move in the same direction as GDP, which is called pro-cyclical; others move in the opposite direction which is referred to as counter-cyclical.

Examples of pro-cyclical moving indicators are (Sörenson & Whitta-Jacobsen, 2005):

- Private consumption
- Imports
- Exports
- Consumer price index
- Employment

This means that the value of these indicators is expected to go up in a stage of expansion (increasing output) and is expected to decrease in a stage of contraction (decreasing output). The conclusion that both imports and exports are correlated with output seems interesting, but it could prove more interesting to study other indicators that could cause differences in the loss or gain in imports and exports between countries.

4. Business cycle and International trade

A relation between shocks in the economy and international trade was already found by Prasad (1999). He concluded that nominal shocks have been an important determinant for explaining changes in trade balance variations of G-7 countries in the period 1974-1996. Further research on the relation between international trade and the business cycle concentrates on the co-movement of business cycles between countries by international trade. Kose & Yi (2001) find that countries with stronger international trade linkages have higher correlations in the movement of business cycles, although the effect their model captures is smaller than empirical evidence suggests. Frankel & Rose (1998) argue that increased specialization leads to lower business cycle synchronization when industry specific shocks are the main source of business cycle fluctuations, while Kose & Yi (2001) argue that when specialization is intra-industry, shocks will be passed-through more quickly, causing a higher synchronization in business cycles together with higher international trade. This argument finds support from recent literature (Burstein, Kurz & Tesar. 2008), which finds evidence of

business cycle synchronization due to international trade in case of vertically integrated industries.

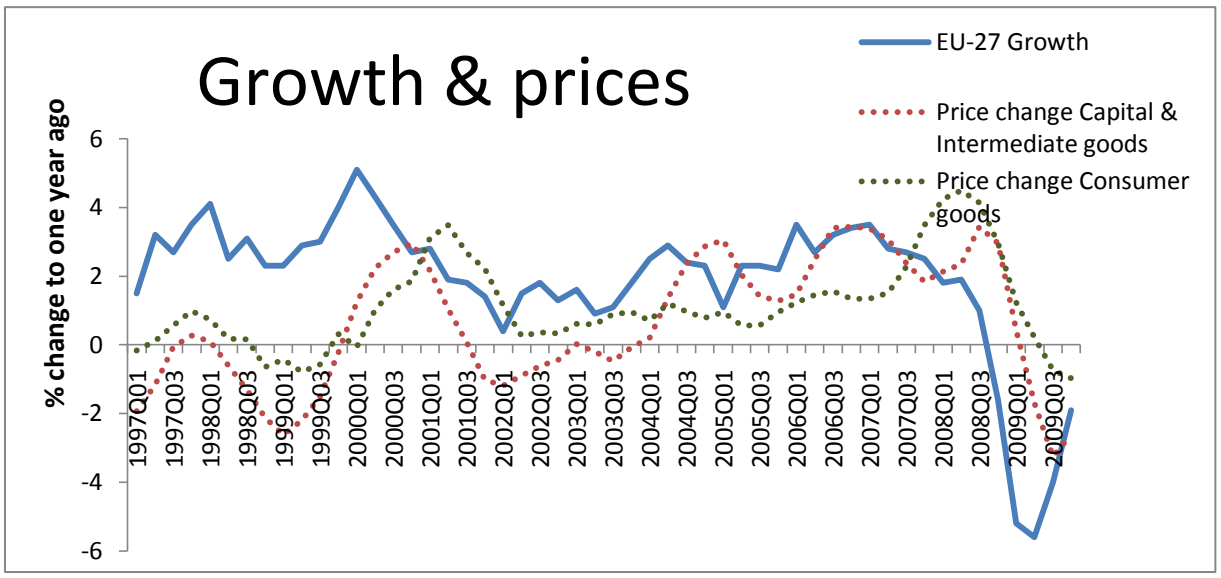
Although this thesis is focused on the effects of different business cycle stages on the patterns of international trade, while the last articles discussed do the opposite, it does show that the business cycle and international trade are connected. Also, it implies that some countries could be more vulnerable than others due to specialization. This specialization is likely to be the result of specific country characteristics. Identifying the effect of these country characteristics on international trade over the stages of the business cycle is one of the aims of this thesis.

Prices and Wages

One indicator in the list of pro-cyclical indicators that could change the valuation of a specific country characteristic is the consumer price index, or the price level in general. The pro-cyclical movement of the price level is not surprising, because in the expansion stage of the business cycle demand is high, allowing firms to ask higher prices for their goods. But demand is low when the economy is contracting, which puts a higher pressure on prices.

If we look at the development of economic growth in the EU since 1997 and price indexes for both consumer goods and two types of producer goods (capital & intermediate goods) in figure 6, this co-movement seems to be quite strong. Although sometimes somewhat lagging or leading, both price indexes follow the economic growth fairly well.

Figure 6



Data source: Eurostat online database

Price data: http://epp.eurostat.ec.europa.eu/portal/page/portal/short_term_business_statistics/introduction

This shows that it seems reasonable to expect prices to move along with output. This will have implications on the price pressure in the stages of the business cycle, and will in that way affect the patterns of international trade. When the economy is expanding and there is a higher demand, there is less pressure to lower prices, and thereby, possibly also less pressure to lower costs. In a contracting economy on the other hand, the pressure on prices is very high, which is likely to cause higher pressure on firm costs as well. This issue has been covered by Domowitz, Hubbard & Petersen (1986). They report that price-cost margins in 284 manufacturing industries in the US respond to changes in aggregate demand, and are pro-cyclical. This effect is stronger in more concentrated industries, which can probably be accounted to the higher competition in such industries. When controlling for import competition, the effect from demand fluctuations still remains. A similar paper which uses 709 UK manufacturing firms (Machin & van Reenen, 1993) also finds a strong pro-cyclical relation between output and firm profit margins, apart from firm-specific factors and industry-specific factors. Somewhat more recent literature (Hart & Malley, 2000) finds a similar result for both the US and Japan, noting that the effect is much larger in the US compared to Japan.

Increased pressure on prices is very likely to cause a higher pressure on costs within firms in order to keep margins as high as possible. This could provide more incentive for firms relocate production to countries with lower costs. As we have discussed earlier in the thesis, wage costs are often dominant in firm (re)location decisions. So the expectation is that firms

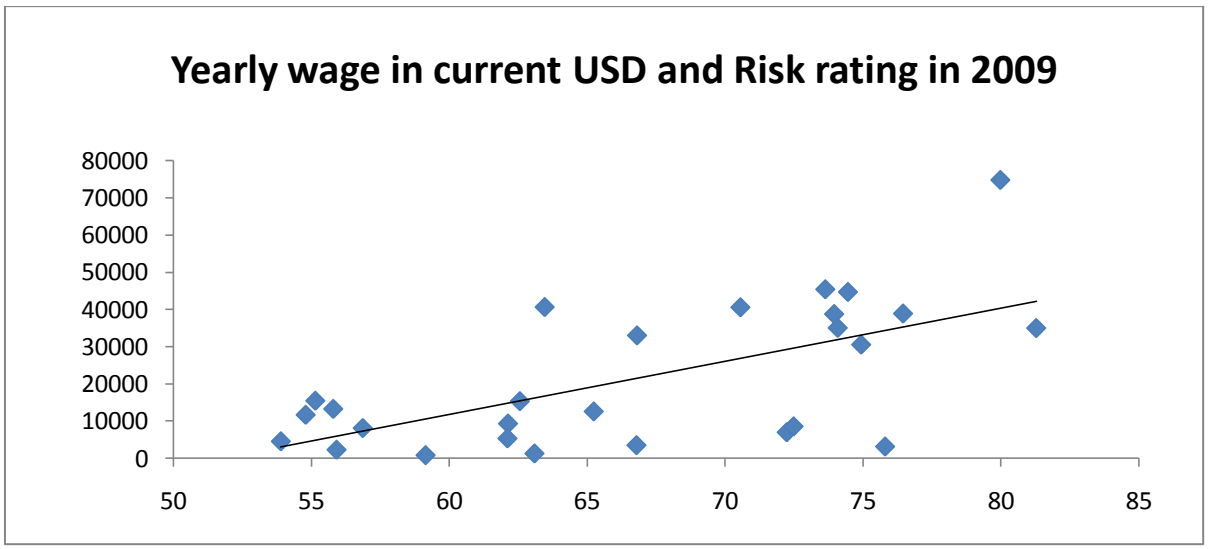
will be more likely to shift production to low-wage countries when the economy is contracting, in order to lower costs, increasing the exports of these countries and increasing their import shares in the home country.

Hypothesis 3: Countries with lower wage levels will expand their share in international trade faster during a contraction period and slower during expansion periods.

Risk

Although lower labor costs can be very profitable for firms, there is also a downside to production in countries with low wages. Earlier in the thesis we already discussed a number of country specific risks, and when taking a quick look at figure 7, risks often tend to be higher in low-wage countries then compared to high-wage countries. Figure 7 shows the yearly wage plotted against the risk rating (higher is better) that was constructed for the empirical research. The exact contents of this risk rating is described later in the thesis in section 5.1.

Figure 7



Sources: ILO (2009 wages) and Business Monitor Online (risk ratings)

It is clear that higher risk ratings usually go together with higher wages. There are just three low-wage countries that do not follow this trend. These countries have relatively low wages combined with high risk ratings. These countries are China, Malaysia and Chile. This should make them very interesting for FDI and as international trading partners.

In relation to business cycle it interesting to analyze if these risks are rated equally over all periods and whether this rating changes over the business cycle stages. Intuitively one could expect firms or agents to become less eager to take risks in a contracting economy, and more likely to take risks during the expansion period of the business cycle. The phenomenon of changes in risk-aversion is known as "time varying risk-aversion" or as "habit formation". Using a model with risk-aversion that varies by news about aggregate consumption and news about inflation, Brandt & Wang (2003) find that relative risk-aversion responds to news about inflation. More importantly, the authors note that: *"it is reasonable to suspect a business cycle pattern in risk aversion"*. The reported relative risk-aversion generated by the model follows a counter-cyclical path, indicating that relative risk-aversion is lower during expansion periods and higher during contraction periods, as one would intuitively expect. Time-varying risk aversion is also used successfully in models that explain variation in risk-premia and stock returns (Smoluk & Bennet, 2008).

A lower risk-aversion during expansion periods would then drive more trade and investment to countries with lower risk ratings (they will be less penalized) while countries with higher risk ratings should benefit during contraction periods because risk-aversion is higher.

A concept somewhat related to time-varying risk aversion is loss-aversion, which purely focuses on people's aversion of people to a (chance of a) loss. It is studied both in psychological and economical research. Peeters and Czapinski (1990) write; *"The affective negative effect means that in the decision making process more weight is accorded to potential losses than to potential gains, and that in the forming of an overall evaluation, negative information is weighted more than positive information."*

A game theory experiment (Tversky & Kahneman, 1991) shows a loss-aversion ratio slightly larger than 2:1, indicating that agents accept a 50-50 gamble only if the possible payoff is at least twice as big as the possible loss, while other experiments show that when all outcomes are depicted as positive, which removes the experience of a loss, an investment opportunity becomes more attractive to agents. **(**Thaler et al, 1997)

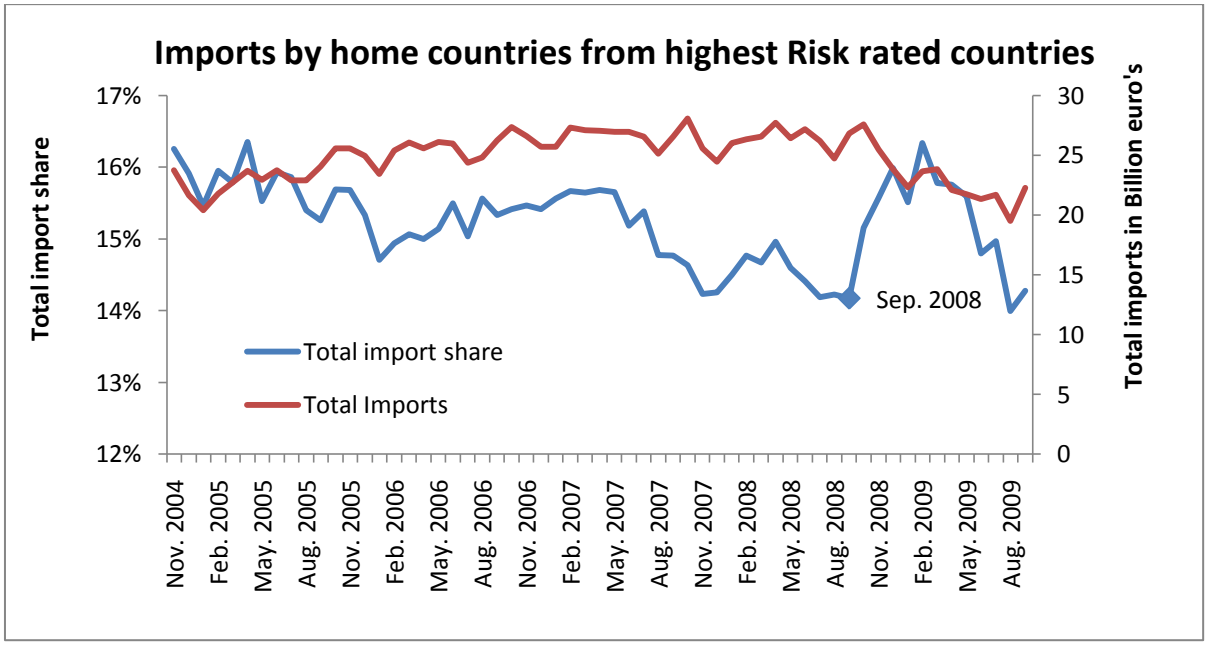
The relevancy to the business cycle is that in a contracting economy, there is more negative information, which is weighted heavier than positive information according to Peeters and Czapinski (1990), and could thereby lower the chance of riskier projects being undertaken.

Also, demand and prices are lower, which will usually result in lower pay-offs for identical activities, compared to the case of an expanding economy. Projects which still have an expected net profit in a contraction period of the economy could be rejected due to a risk on a (small) negative outcome, which is weighted much heavier than in a period of expansion.

In this way, projects with higher risks are more likely to be discarded, compared to projects with lower risks. Since risks can be country specific, the expectation is that investment and trade will also be in favor of countries with lower risks.

If we look at figure 8 and 9, containing the import shares of the 8 partner countries in our dataset with the highest and the lowest risk ratings over our period of research, we might be able to see such an effect. This can only give an indication though, because there might be other factors causing the changes in trade. The importing countries are the home countries used later in the research, which are the United Kingdom, the Netherlands, France and Germany.

Figure 8



The import shares of the top 8 countries in our dataset according to the risk rating show an interesting movement. The total import share decreases slowly over time, while quickly increasing near the start of the financial crisis, and therefore moving in line with the expectations stated earlier. This break from the trend does not seem to hold very long though. After about 6 months the share of the best risk rated countries peaks and starts declining until it returns near the trend after another 6 months.

Figure 9

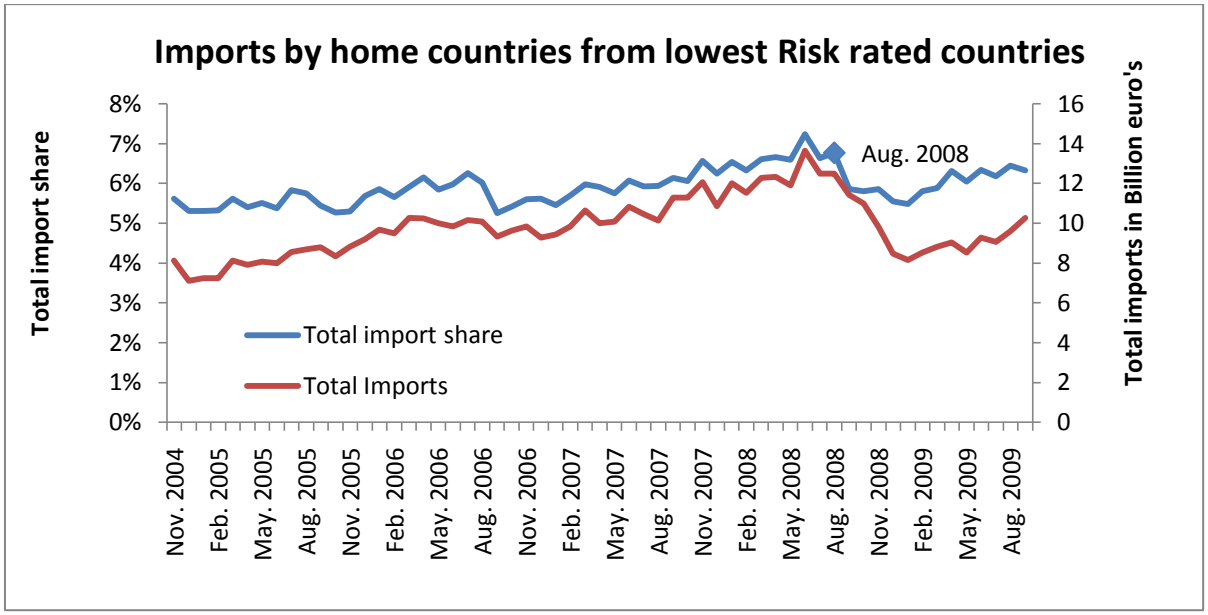


Figure 9 shows the 8 lowest risk rated countries in the dataset, which also moves in line with the expectations. The share of imports slowly rises over time over the first few years and starts declining quickly around the start of the economic crisis in the fall of 2008. In this figure, the trend deviation does not hold very long either, but recovers after about 6 months, though moving back somewhat slower to the trend than the top 8 rated countries.

Although the figures above are very limited and exclude a large amount of other possible factors that influence the captured import share, they still give some indication that the expected effect could be present, which leads to the last hypothesis:

Hypothesis 4: Countries with higher risk ratings will increase their share in international trade more during contraction periods and less during periods of expansion.

In the next chapter I will try to identify determinants for import shares, the determinants for changes in import shares within countries, while finishing with the effect of the business cycle on the changes in import share determinants within countries in section 5.4.

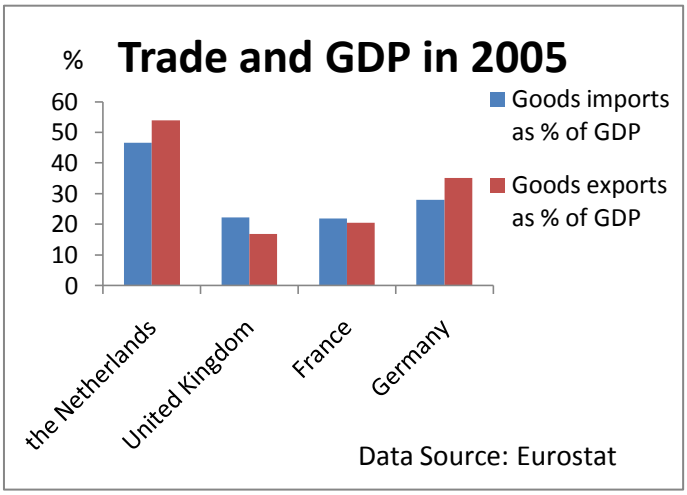
5. Empirical analysis

This chapter of the thesis will focus on explaining goods trade flows and changes in goods trade flows between the home and partner countries based on specific country characteristics. The first section will cover all data and variables, while the latter sections cover the results.

5.1 Data

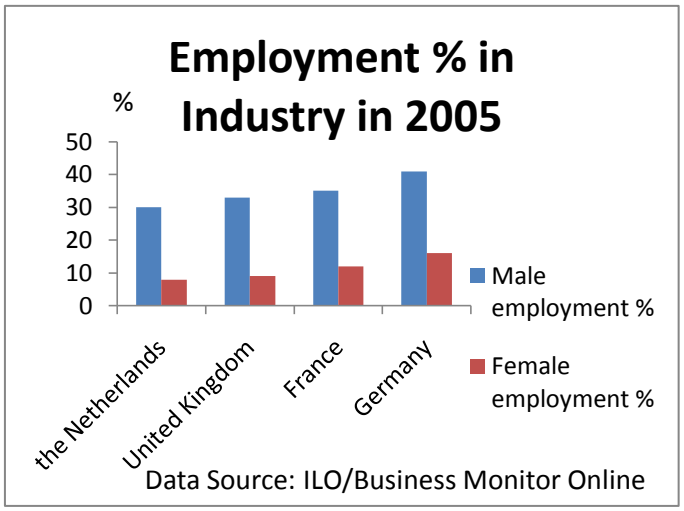
For the empirical analysis I have collected monthly goods import data from 4 European countries for a 5-year period from Eurostat. The actual period used for the regressions is November 2004 – Oktober 2009. Unfortunately, not all variables have data available before November 2004. So for regressions requiring changes to one year earlier the period is shortened to November 2005 – Oktober 2009.

Figure 10



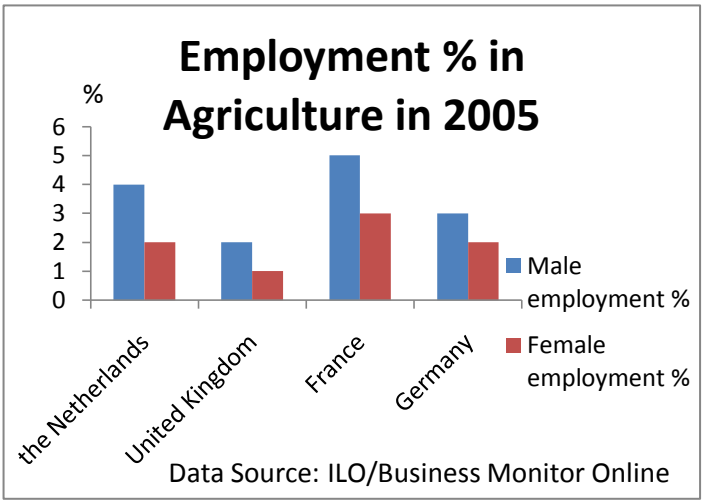
As home countries, four major European countries have been selected: The Netherlands, Germany, France and the United Kingdom. The reason for these countries is because their economies all have a different angle. Looking at figure 10, it becomes obvious that the Netherlands has a focus on international trade.

Figure 11



Looking at the employment statistics in figure 11 it is clear that Germany has a large industrial sector. Germany has been the world's biggest net goods exporter for many years, until it was finally taken over by China in 2009. All employment is broken down to male/female because combined statistics were not available in the available data sheets.

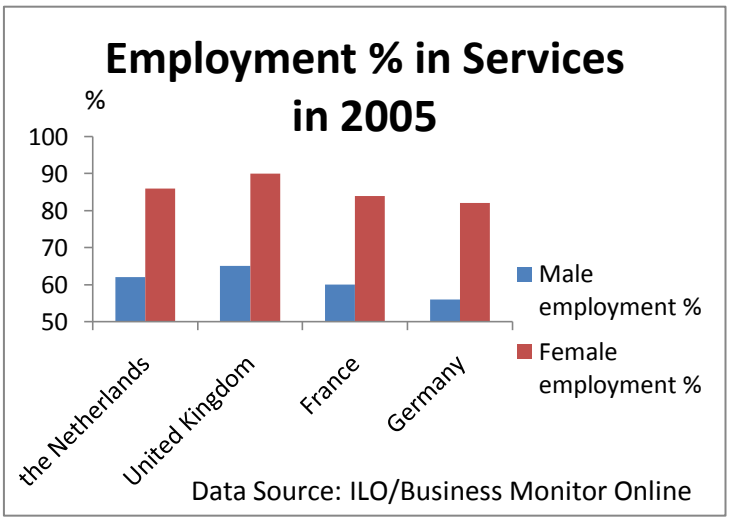
Figure 12



The agricultural employment statistics in figure 12 demonstrate that France has a relatively high share of employment in agriculture compared to other countries. This makes it likely that the agricultural sector is relatively large in France. Therefore we can expect that imports and exports are also higher in related sectors, like agricultural inputs and by-products.

Figure 13

The services industry shows its highest employment share in the United Kingdom, although all countries show a fairly high employment share in services, mostly for women. Although this research only uses goods trade data, excluding trade in services, it is useful to include the UK in order to have a balanced set of countries.



The partner countries from which these countries import in this research are:

Europe	Poland	**North-America**	India	**Africa**
Austria	Romania	Canada	Japan	Egypt
Switzerland	Slovenia	United States	South-Korea	Morocco
Czech Republic	**Latin America**	**Asia & Oceania**	Malaysia	South-Africa
Spain	Argetina	Australia	New-Zealand	**Other**
Finland	Brazil	Bangladesh	Pakistan	Israel
Hungary	Chili	China	Thailand	Russia
Italy	Mexico	Indonesia	Vietnam	

Unfortunately there are little African countries included. The reason is that for most African countries, the monthly trade values where very low, and the differences between months were extremely high. This resulted in very extreme values for the calculated changes in trade. Still, there should be enough different countries included to make the research viable.

Total monthly imports by home countries are used to calculate the share in total imports for each of the partner countries in each period. The share of total imports will be used as dependent variable to explain trade flows. The total imports are the total world imports by the home country, and not the total of the countries included in the dataset. This approach is chosen because the total world imports are most stable and less dependent on fluctuations of individual countries.

Mathematically this looks like:

$$(1) Import\ Share^{h}_{p,m} = \frac{Imports^{h}_{p,m}}{Total\ Imports^{h}_{m}}$$

Where h denotes the relevant home country, p the partner country from which the imports are coming, and m is the relevant month.

To explain changes in trade flows we use the change in the share of total imports. This change is the percentage change in the share compared to the same month one year ago. This approach is chosen to exclude seasonal effects.

Mathematically this means:

$$(2) Change\ in\ Import\ Share^{h}_{p,m} = \left(\frac{Import\ Share^{h}_{p,m} - Import\ Share^{h}_{p,m-12}}{Import\ Share^{h}_{p,m-12}}\right) x\ 100$$

Where h denotes the relevant home country, p the partner country from which the imports are coming, and m is the relevant month.

Risk data

Identifying a relation of a specific country risk on goods trade is one of the main targets of this thesis. Therefore, detailed risk data is crucial. Because there are many aspects to risks in a country, I have taken a number of ratings to construct a general risk rating. The ratings originate from Business Monitor Online.

The ratings used are:

Short-term political rating:

Any firm benefits from a stable political situation. If a government is unable to create, or enforce, stable policies, this creates uncertainty for firms. Furthermore, an unstable political situation can cause social unrest, which is likely to cause further damage to the economy.

The short-term political rating takes a broad number of indicators into account. Main components are the policy making process, social stability, the international environment and policy continuation. The ratings are defined as the government's ability to create, pass, implement and enforce policy is the coming two calendar years.

Short-term economic rating

A stable economic environment should be beneficial for firms and the economy in general. High inflation and high exchange rate fluctuations can be troublesome for any firm doing any type of business in a country.

The short-term economic rating consists of a large number of indicators. The main components which make up the rating are: Economic activity, Monetary indicators, Fiscal indicators, External indicators and Financial indicators. The ratings are averages over a measured period of three years. One year back in the past, the current year and one year of prediction.

Long-term economic rating

Since many contracts are signed for multiple years and often involve investment in the partner country, continuing economic stability is important for international trade development.

The long-term economic rating uses the same main components as the short-term economic rating, plus an additional component rating the structure of the economy. It also differs in the scope of time. The long-term economic rating goes 5 years back from the current year and predicts one year, which adds up to a total of 7 years.

Business environment rating

Doing business is not equally easy or hard in all countries. Government regulation, infrastructure and corruption are just a few factors that can ease or toughen the process of doing business.

One of the business environments main components is infrastructure, not just the physical infrastructure, but also the labor infrastructure and the financial infrastructure. Another component is the quality of institutions, including bureaucracy, the legal framework and corruption. The last component is the market orientation of a country, containing the tax environment, the openness of the country and the level of government intervention.

These four ratings are used separately, but are also constructed in to one total rating, in which all ratings are weighted equally.

(3) $Total\ rating =$

$$\frac{STPolitical\ rating + ST\ economic\ rating + LTeconomic\ rating + \ Business\ environment\ rating}{4}$$

All four ratings run from 0 to 100, with 100 being the best score. The total score is the average of all four.

The total risk rating will result in a very broad rating that takes many aspects of a country's risks and attractiveness in to account. It gives a clear view about the total attractiveness of a country. Because the variable is so broad, it does become hard to identify individual effects, which is why all ratings are also considered separately.

Wage data

The wage data used in this research originates from the International Labor organization (ILO). The wage data from the ILO is used by Business Monitor Online (BMI) to create a *"yearly wage in manufacturing"*. They have also predicted some missing, and future data.

I use both this wage statistic which measures actual wage in dollars, as well as a grouped variable. In this grouped variable, countries are put into one out of four wage groups depending on their wage level. The reason to do this is the large scale difference between the

wage level and the import shares. This marginalizes the actual effect found in a regression, and makes it harder to interpret. Using the logarithm of the wage resulted in very poor results, while using a grouped variable works very well and it is easier to interpret the size of the relation between different types of countries, without having to know actual wage values. It also allows for estimation of some missing data.

The following wage groups are used:

1 : Very low, <5.000 USD yearly wage in manufacturing in 2009
2 : Low-middle, 5.000 – 15.000USD yearly wage in manufacturing in 2009
3 : Middle-high, 15.001 – 32.500USD yearly wage in manufacturing in 2009
4 : Very High, >32.500USD yearly wage in manufacturing in 2009

In case of regressions using changes, the percentage change in the wage in USD is used, since there are very little changes over time in the grouped wage variable.

Business cycle data

To identify specific effects of the business cycle on international trade flows, the state of the business cycle needs to be included in the regressions. Real GDP growth is the most intuitive measure to use as proxy for the state of the business cycle. But the actual real GDP growth itself is not a proper measure, since it is the deviation from the trend which matters. Finding the trend and the deviations is usually done by using the Hodrick-Prescott filter. But because a relatively short period is analyzed, the number of observations in our dataset is too small to construct a reliable trend. The HP filter requires more observations in order to construct a reliable trend.

Another option is the unemployment level. This is a level which could do well in describing the state of the business cycle. Unfortunately this variable lags behind the business cycle. Since the data is so recent, it is impossible to correct for this, since there is no future data to use.

Because both options above have serious problems, the state of the business cycle is being described by a constructed dummy variable which takes on the value of 0 when the economy is expanding, and has a value of 1 during a state of contraction. The determination of the business cycle stage is done on the basis of real GDP statistics and new industrial orders statistics from Eurostat, in order to measure economic activity. From November 2004 up to

September 2008, GDP is consistently growing in all four home countries. Only Germany experienced one quarter in which GDP declined slightly, but this was not consistent. The first real decrease in GDP is in the last quarter of 2008, which also shows plummeting new industrial orders in all countries. Although GDP growth was already slowing (but still positive) in the third quarter of 2008, new industrial orders were still rising, indicating that economic activity was not clearly decreasing yet, therefore the fourth quarter is estimated to be the start of the contraction period, which continues until the end of the research period (oktober 2009) since both GDP and new industrial order changes remain negative.

Economy size

Because bigger partner countries are likely to have bigger trade shares, there is a need to correct for the size of the economy of the partner. This is done by including the GDP of partner countries in the regression.

Because trade and growth seem to have a relation, as discussed earlier, there could be endogeinity when trying to explain a trade share or trade share change by GDP. A higher trade volume leads to a higher trade share, but can also lead to a higher GDP. To tackle this issue, the GDP variable is lagged by one year. When trying to explain within country changes, the change of the lagged GDP against one month earlier is used as measure.

Exchange rate

Since all trade values are measured in euro's, variations in exchange rates can alter the trade flows measured in euro's, while the physical flow of goods remains identical. But there is also another side to the issue. A change in exchange rate can also alter the physical flow due to a change in relative prices. When a partner country's currency depreciates, the trade value of the current flows becomes lower. At the same time, the prices in the partner country also drop relative to the prices in the home country. These lower prices could make the country a more attractive trading partner, which could increase trade.

To capture possible effects, I have included a variable indicating the percentage exchange rate change to one month earlier. The exchange rates are based on monthly averages.[2]

As discussed earlier, there might also be a negative relation between exchange rate variability and international trade, due to the potential risk on losses from exchange rate changes . The

[2] http://www.oanda.com/currency/average

issue of exchange rate variability is already included total risk variable, trough the short-term and long-term economic ratings.

Unified customs union

Countries with a unified customs union are likely to trade more with each other, because there are less impediments to trade, like tariffs and non-tariff barriers. Therefore we use a dummy variable to capture the effect of being in the same customs union. In this case, all home countries are EU members, so all partner countries which are member of the EU get a value of 1, while non-EU partners get a value of 0.

Geographical data

Because transport costs are not equal to zero, there needs to be correction for the transport costs between countries. To correct for transport costs, the distance between the home and partner country's capital is included. These distances are not based on trade routes, but purely on a straight line between the capitals[3]. Still, it should be a fairly good proxy for distance and transport costs.

There is one limitation though. The majority of goods traded over larger distances are transported over sea. This is a relatively cheap way to transport. In most cases, the distance should do fine as proxy, but in the case where countries are landlocked, these countries might face higher transport costs. This will impair both imports and exports, because the total price will turn out higher. For this reason we also correct for countries being landlocked with a dummy. (0 = not landlocked, 1 = landlocked)

In addition, I have tried including country- and continent specific dummies in order to identify any other effects which can be attributed to a specific country or continent. Unfortunately both dummy groups showed very high multicollinearity with other variables included in the regressions, including the landlocked dummy, the customs union dummy and the GDP variables. Therefore both these dummy groups will be omitted from the regression in order to keep the results clean.

[3] http://www.chemical-ecology.net/java/capitals.htm

5.2 Explaining import shares

In this section we will use a number of variables described in section 5.1 to explain the import shares of partner countries in the home country's total imports. Besides the main variables, risk and wage, there are a number of control variables included. In the first regression the wage in USD is used, while in the second and third regressions, the grouped wage variable is used. Basically the regression looks like:

$$(4)\ Partners\ Import\ Share_m^h = Risk_{p,m} * x_1 + Wage_{p,y} * x_2 + GDP_{p,y-1} * x_3 +$$

$$\ln Distance_p * x_4 + Landlocked_p * x_5 + Customs_p * x_6 + Time\ dummy_y * x_7 + c$$

With h indicating a value in the home country, p indicating a value in the partner country, m indicating the relevant month and y indicating the relevant year.

Table 1

Regression	I	II	III
Total Risk Rating	**0,017*** **	**0,017*** **	
Short-Term political rating			**0,02*** **
Short-Term economical rating			**0,08*** **
Long-term economical rating			**0,13*** **
Business environment rating			**-0,05*** **
Wage USD	**-6,240E-6*** **		
Wage Group		**-,090*** **	**-0,051*** **
GDP (lagged)	**1,777E-7*** **	**1,421E-7*** **	**1,481E-7*** **
Distance	**-2,589E-5*** **	**-2,331E-5*** **	**-2,261E-5*** **
Landlocked	0,07	**-0,059*** **	-0,003
Customs	**0,064*** **	**0,146*** **	**0,172*** **
Constant	-0,726***	-0,645***	-0,798*

***** significant at the 0.01 level** **** significant at the 0.05 level** *** significant at the 0.1 level**

Not shown: Time dummies. Posted coefficient are results after removal insignificant variables.

Regression	I	II	III
R^2	0,431	0,428	0,474
Number of Observation	7608	7608	7608
Relevant period	11/2004 - 10/2009	11/2004 - 10/2009	11/2004 - 10/2009

Almost all variables in all the regressions show very significant results. In the first two regressions, both the total risk rating, as well as both wage variables behave as expected. Countries with a higher (=better) risk rating have a larger import share in the home countries,

while countries with a lower wage level in manufacturing also capture a higher import share in the home countries.

In the third regression, the total risk rating is split up in to the four different risk variables that were originally used to construct the total risk rating. The short-term political and the short-term economic ratings both show a very significant positive relation with the captured import shares, as well as the long-term economic rating, which has the biggest coefficient by far.

It is hard to draw conclusions on the direction of the relations, mostly for the economical ratings. It is possible that the factors behind a higher economical ratings lead to increased trade, but the opposite direction, or both, is possible as well. Trade accounts are not dominant in the economic ratings though, so it is likely that the factors leading to the higher rating are the cause of higher trade shares.

Surprisingly, the business environment rating in the partner country shows a negative relation with the captured import share in the home country. Intuitively, a positive relation would seem more likely. I would expect a better business environment to attract more trade instead of less. The result could indicate that better business environments attract more horizontal FDI, which in this case replaces international trade. This would mean that trade and FDI are not complements in all cases, but can also be substitutes, as the arguments by Markusen (2002), previously addressed in section 2.2, suggest. Intuitively this does not seem unreasonable, since investing has bigger risk than buying in a country. This would keep firms from investing in countries with a lesser business environment, and rather using international trade in order to minimize commitment.

Hypothesis 1 is confirmed by the results from the regressions in table 1, since a lower wage level leads to a higher import share in all regressions. Hypothesis 2 also finds much support, because higher risk ratings (=lower actual risk) lead to higher import shares in almost all cases. Only the negative relation with the business environment rating is not in line with the hypothesis 2.

Within the remaining variables, the distance and customs union variable also show strong results. The customs union variable shows that partner countries within the same customs union as the home country capture higher import shares compared to partner countries outside it. The distance variable shows a negative effect for partner countries further away from the home countries. This supports the idea that transport costs are important for international

trade, different from the assumptions in classical Hekscher-Ohlin models. The variable for countries being landlocked or not shows less consistent results. Only in the second regression, using the total risk variable and the grouped wage variable, it shows a very significant, negative relation with the captured import share.

5.3 Explaining within country import share changes

After looking at the determinants of different import shares between countries in the previous section, we now move to explaining changes in import shares by within country changes in these determinants.

This regression has a lower number of cases because some data was not available before November 2004, which makes it impossible to calculate most of the changes between monthly values of 2004 and 2003. This shortens the period to November 2005 – Oktober 2009 in this regression.

(5) $Change\ in\ Partners\ Import\ Share_m^h = Risk\ Change_{p,m} * x_1 + Wage\ Change_{p,y} * x_2 + GDP\ Change_{p,y} * x_3 + Change\ Euro_{p,m} * x_4 + Time\ dummy_y * x_5 + c$

With h indicating a value in the home country, p indicating a value in the partner country, m indicating the relevant month and y indicating the relevant year.

Table 2

Regression	**I**	**II**
Total Risk Rating Change	0,048	
Short-Term political rating change		**-0,139*** **
Short-Term economical rating change		0,25
Long-term economical rating change		**0,279*** **
Business environment change		-0,49
Wage USD Change	**0,076** **	**0,149*** **
GDP Change (lagged)	**0,996*** **	**0,823** **
Euro Exchange rate Change	**-0,189*** **	**-0,3*** **
Constant	-5,066***	-6,771***

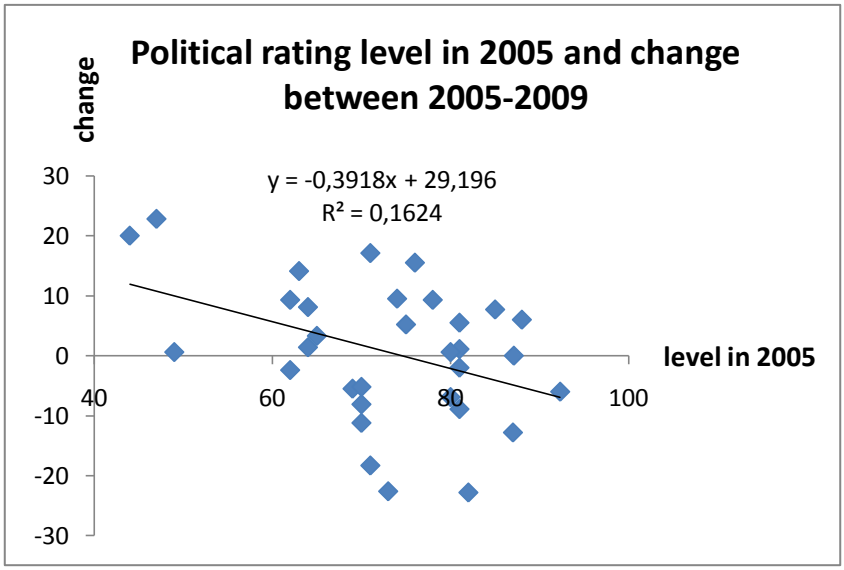
***** significant at the 0.01 level ** significant at the 0.05 level * significant at the 0.1 level**

Not shown: Time dummies

Regression	**I**	**II**
R^2	0,022	0,029
Number of Observation	4440	4377
Relevant period	11/2005 - 10/2009	11/2005 - 10/2009

Again, there are quite some significant variables. When using the change in the total risk rating variable, there is no significant result, but when the variable is split up again, there are some interesting results. The change in the short-term political rating shows a significant negative relation with the change in the captured import share, indicating that trade has shifted more towards countries with a lowering (=worsening) short-term political rating over our period of research. This seems in conflict with the results in the previous regressions, where we observed a positive relation between a higher political rating and the captured import share. But this is not necessarily the case, it is possible that countries with the highest ratings have generally seen their ratings drop, while still having a relatively high rating. This results in a negative change in the political rating for a country that is still relatively attractive. If we plot this, we can see whether such an effect is present.

Figure 14



The figure shows that such an effect is modestly present, which makes it hard to draw any conclusions.

The change in the long-term economic rating is also very significantly related to the changes in captured import shares. The previous section already showed a positive relation between the levels of both variables, and the changes show the same. A positive change in the long-term economic rating goes together with a growth in the captured import shares in the home countries. The other two ratings do not have a significant relation with the change in captured import shares.

The change in the wage shows a positive relation with the change in import shares, this result can be interpreted in various ways. It can seem like a increasing wage results in a higher import share. But this conflicts with the results of the previous section, in which I conclude that a higher wage level in a partner country goes together with a lower captured import share.

A different interpretation is that the relation goes the other way, which would mean that a higher import share leads to an increase in income and allows for increasing wages. This is also in line with the positive relation found between the GDP change variable and the change in import shares that is found. The wage used is the wage in manufacturing, which is usually a relatively low paying sector. Therefore it is also in line with the view that trade is not just good for the economy in total, but also good for the poor. (Dollar & Kraay, 2001)

This interpretation does not conflict with the results in the previous section, since it would mean that low-wages attract trade, while this trade itself increases wages.

Within country changes show less support for hypothesis 1 and 2 then cross country levels. Hypothesis 1 is not confirmed by these regressions, since the coefficient of the wage variable is positive instead of negative. Support for hypothesis 2 is ambiguous, the total risk variable is insignificant while the separate ratings show mixed results.

One last significant variable is the change of the local exchange rate against the euro. The negative sign means a depreciation of the local currency leads to a lower import share. This indicates that the lower value of currently traded goods is not offset by new trade due to the lower price of goods, which results from the exchange rate depreciation.

5.4 Changes in import shares with business cycle effects

This section has the objective to identify whether the business cycle affects the determinants of international trade. To find an effect of this kind, interaction variables are introduced into the regression. These variables consist of a proxy for the state of the business cycle together with the risk and wage variables

A significant interaction variable could indicate that firms change their valuation or preferences on specific country characteristics over different stages of the business cycle. As discussed earlier, firms might shift to countries with less risk or to countries with lower wages in a state of economic contraction.

This gets us to the following equation:

$$(6)\ Change\ in\ Partners\ Import\ Share_m^h = Risk\ Change_{p,m} * Business\ Cycle * x_1 + Wage\ Change_{p,y} * Business\ Cycle * x_2 + Risk\ Change_{p,m} * x_3 + Wage\ Change_{p,y} * x_4 + GDP\ Change_{p,y} * x_5 + Change\ Euro_{p,m} * x_6 + Time\ dummy_y * x_7 + c$$

With h indicating a value in the home country, p indicating a value in the partner country, m indicating the relevant month and y indicating the relevant year.

Table 3

Variable/Regression	I	II
Total Risk Rating Change	**-0,232*** **	**-0,246*** **
Wage USD Change	**0,187*** **	**0,186*** **
Business cycle * Risk Change	**0,396*** **	**0,411*** **
Business cycle * Wage Change	-0,002	
GDP (lagged) Change	**0,859*** **	**0,857*** **
Euro Exchange rate Change	-0.074	
Constant	**-6,378*** **	**-6,271*** **

***** significant at the 0.01 level ** significant at the 0.05 level * significant at the 0.1 level**

Not shown: Time dummies

Regression	I	II
R^2	0,029	0,029
Number of Observation	4440	4495
Relevant period	11/2005 - 10/2009	11/2005 - 10/2009

The results in table 3 show a significant interaction effect for the risk variable, indicating that partner countries with growing risk ratings will see a growing import share in the home country during a contraction of the economy, while countries with decreasing risk ratings see their import share decrease during a contraction of the economy, which is in line with hypothesis 4.

The interaction variable for wage does not show a significant relation with the change in the captured import share. The original variable remains positive and significant, implying that international trade growth goes together with a growth of wages, unrelated to the state of the business cycle. These results are in contrast with my expectations in hypothesis 3.

The change in the lagged GDP shows a very significant positive effect, indicating that economic growth goes together with higher import shares. The change in the exchange rate of the local currency towards the euro does not hold a significant relation in this regression, like it did in the previous regression.

In table 4, we can see the result of splitting up the total risk variable to the four components that construct it.

Table 4

Variable/Regression	I	II
Short-Term political rating change	**-0,202*** **	**-0.215*** **
Short-Term economical rating change	-0,057	
Long-term economical rating change	0,099	0,088
Business environment change	0,028	
Business cycle * Short-Term political rating change	**0,289** **	**0,284*** **
Business cycle * Short-Term economical rating change	0,010	
Business cycle * Long-term economical rating change	**0,487*** **	**0,464*** **
Business cycle * Business environment change	-0,330	
Business cycle * Wage Change	0,067	0,059
Wage USD Change	**0,139*** **	**0,139** **
GDP (lagged) Change	**0,934*** **	**0,941*** **
Euro Exchange rate Change	**-0,252** **	**-0,242** *
Constant	**-6,506*** **	**-6,604*** **

***** significant at the 0.01 level ** significant at the 0.05 level * significant at the 0.1 level**

Not shown: Time dummies

Regression	I	II
R^2	0,034	0,034
Number of Observation	4377	4374
Relevant period	11/2005 - 10/2009	11/2005 - 10/2009

The same two risk ratings as in the regressions without the business cycle show a significant effect, while the other ratings remain insignificant. The original short-term political rating variable remains negative and significant, while the interaction variable takes on a significant, and slightly larger, positive coefficient. The interpretation is that during an expansion stage of the business cycle, a lowering short-term political rating in the partner country leads to it gaining a higher import share in the home country, while capturing a lower import share in a contraction stage.

The original long-term economical rating variable loses it significant effect by introducing the interaction variable in to the equation. The coefficient is also much smaller, although it remains positive. The interaction variable shows a very significant positive coefficient, which is also larger than the coefficient of the original variable. This indicates that changes in the long-term economical rating are mostly important during the contraction stage of the business cycle, and not (so much) during expansion. During an expansion a change of the partner countries long-term economical rating does not lead to a change in the captured import share in the home country, while in the case of a contraction period, a change of the long-term economical rating does go together with a change in the captured import share.

These results show further support for hypothesis 4, since the separate ratings, in line with the total risk rating, indicate that growing risk ratings are good for the captured import share in a contracting economy.

The interaction variable for wage remains insignificant, in contrast to the original wage variable, strengthening the conclusion that higher international trade goes together with higher wages independent from the business cycle. I am therefore unable find any support for hypothesis 3.

The variable containing the changes in the exchange rate of the local currency towards the euro shows a significant negative relation with the captured import shares. This has been the case in all regressions but regression 3.1. A depreciation of the local currency of a partner country causes a lower captured import share in the home country measured in euro's. The lower goods prices caused by the lower exchange rate do not add (enough) extra sales to make up for the lower value of the current trade volume.

6. Conclusions

In this thesis I have tried to find determinants of import shares and the determinants of the changes in these import shares, both with and without adding the business cycle to find out if the stage of the business cycle has an influence on the determinants of international trade.

Finding determinants of import shares was very straightforward and provided very clear results. The wage level in partner countries shows a clear negative relationship with the observed import shares, pointing out that countries with lower wages are possibly attractive trade partners. Furthermore, the risk rating of countries also shows a very strong relationship with the import shares these countries capture. Countries with lower risks capture bigger import shares compared to countries with more risks. When using the different components of the risk variable separately I find that the short-term political risk rating and both the short- and long term economical rating show a significant positive relation with the captured import shares, with the latter being the most important. The business environment rating shows a surprising and counter-intuitive negative relation with the captured import shares. A possible explanation is that a good business environment leads to more horizontal Foreign Direct Investment, replacing international trade.

The next objective was to indentify whether within country changes in determinants of international trade have a relation to the within country change of import shares. The results show that an increase in wage within a country comes together with a higher import share in the same country, which could seem conflicting with the previous results, because the previous results show a negative relation between the levels of wage and the import shares. The direction of the relation is not clear though, which could mean that the higher import share raises the wage level instead of the opposite. This is not conflicting with earlier results, since the conclusion would be that trade is generally directed to countries with lower wages, but that this increase in trade raises GDP and the wage level. Although this scenario seems likely and is also in line with literature on trade and poverty, the exact direction of the relation remains unclear.

Using the constructed total risk rating provided insignificant results when trying to explain within country changes, but the separate ratings did provide some significant results. Within country changes of the long-term economic rating are positively related with changes in the captured import shares by these countries, while changes in the short-term political rating

have a surprising negative relation with the captured import share. A possible explanation is a modest negative relation between the initial levels in 2005 and the change until 2009, but this remains hard to prove.

The main target of this thesis was to indentify whether the valuation of wage and risk characteristics changes over different stages of the business cycle. The expectations were that agents would become more risk-averse and would look for lower wages in a state of economic contraction. This would result in a heavier loss in import share for countries with higher risk profiles and a bigger gain in import shares for countries with lower wages.

The results partially confirm these expectations. The change in the total risk rating variable shows a significant and positive interaction effect with the business cycle state. The interpretation is that during a contraction period, countries with growing risk ratings (=lower actual risk) also see growing import shares, while countries with declining risk ratings also see their captured import shares decline. When using all risk ratings separately instead of using one constructed rating, it is both the short-term political rating as well as the long-term economical ratings that show a significant positive relation with the captured import shares by partner countries. The short-term political rating turns positive only during a contraction state. Earlier results without the business cycle, showed a negative relation. The long-term economic rating interaction variable takes up the effect of the original, non-interacted variable, indicating that the positive effect of this rating is mostly observed during the contraction period of the business cycle, and not (so much) during expansion. These results show a possible increase of risk-averseness during a contraction period of the business cycle, since growing ratings lead to higher import shares during a contraction period, while doing relatively worse during an expansion period.

The wage variable interacted with the state of the business cycle does not show such results and remains insignificant in all regressions. The original, positive relationship between changes in wage and changes in captured import shares holds. But this does not necessarily mean that firms do not look for lower wages. In our first regression we did see that lower wage levels are beneficial to captured import shares, the later results show they are not so much moved by changes within countries, and that increasing international trade goes together with increasing wages, independent from the business cycle.

Overall, this research shows that there is a number of country characteristics that have a relation with a country's share in international trade. These characteristics can both increase and decrease the attractiveness of a country as trading partner. Additionally I have shown that the valuations of specific country risk characteristics can change over different stages of the business cycle.

This is an important conclusion for governments and any other organization involved with international trade policies. For a large part, it is government policy making and policy enforcement determine the characteristics that make a country more or less attractive, and changes in the valuation of these characteristics can make countries more or less vulnerable to shocks in the world economy. Monitoring and improving these characteristics is therefore a crucial task for any government that wishes to achieve long-term economic growth through international trade.

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8. Appendix

Detailed regressions

Table 1, regression I

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	-,726	,045	-15,997	,000		
	Risk_total	,017	,001	23,753	,000	,470	2,127
	Wage_USD	-6,240E-6	,000	-17,503	,000	,512	1,952
	Lag(GDP_xMillion,12)	1,377E-7	,000	61,659	,000	,875	1,143
	Distance	-2,589E-5	,000	-21,147	,000	,565	1,771
	SCustoms	,064	,013	4,832	,000	,554	1,806
	D_2006[b]	,019	,013	1,405	,160	,667	1,498
	D_2007[b]	,013	,013	,976	,329	,669	1,496
	D_2008	,033	,013	2,498	,013	,659	1,517
	D_2009	,113	,015	7,687	,000	,641	1,561

a. Dependent Variable: Share

b. Removing the insignificant dummies does not change the results of the other variables notably.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,657[a]	,431	,431	,3780847

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	823,974	9	91,553	640,461	,000[a]
	Residual	1086,262	7599	,143		
	Total	1910,237	7608			

Table 1, regression II

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	-,645	,044	-14,587	,000		
	Risk_total	,017	,001	22,691	,000	,423	2,362
	Wage_Group	-,090	,006	-14,926	,000	,387	2,581
	Lag(GDP_xMillion,12)	1,421E-7	,000	60,152	,000	,786	1,272
	Distance	-2,331E-5	,000	-18,456	,000	,534	1,874
	SCustoms	,146	,014	10,768	,000	,527	1,898
	D_2006[b]	,014	,013	1,077	,281	,668	1,496
	D_2007[b]	,000	,013	-,042	,966	,671	1,491
	D_2008[b]	,012	,013	,918	,359	,668	1,497
	D_2009	,095	,015	6,505	,000	,656	1,525
	Landlocked	-,059	,015	-3,823	,000	,728	1,373

a. Dependent Variable: Share

b. Removing the insignificant dummies does not change the results of the other variables notably.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,654[a]	,428	,427	,3791929

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	817,741	10	81,774	568,716	,000[a]
	Residual	1092,496	7598	,144		
	Total	1910,237	7608			

Table 1, regression III

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	-,798	,046	-17,235	,000		
	Spoli	,002	,001	4,257	,000	,487	2,052
	Seco	,008	,001	13,669	,000	,437	2,288
	Leco	,013	,001	15,234	,000	,343	2,919
	Buev	-,005	,001	-9,904	,000	,328	3,046
	Wage_Group	-,051	,007	-7,681	,000	,293	3,416
	Lag(GDP_xMillion,12)	1,481E-7	,000	65,699	,000	,794	1,259
	Distance	-2,261E-5	,000	-18,238	,000	,509	1,964
	SCustoms	,172	,013	12,770	,000	,492	2,031
	D_2006	-,044	,013	-3,369	,001	,636	1,573
	D_2007	-,080	,014	-5,924	,000	,585	1,708
	D_2008	-,047	,013	-3,517	,000	,607	1,648
	D_2009	,091	,014	6,293	,000	,612	1,635

a. Dependent Variable: Share

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,689[a]	,474	,473	,3636066

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	905,971	12	75,498	571,044	,000[a]
	Residual	1004,265	7596	,132		
	Total	1910,237	7608			

Table 2, Regression I

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	-5,066	1,875	-2,702	,007		
	Total_Risk_Change	,048	,035	1,371	,171	,705	1,418
	Wage_USD_change	,076	,040	1,912	,056	,585	1,709
	GDPLAG_change	,996	,154	6,452	,000	,764	1,309
	Change_euro	-,189	,086	-2,211	,027	,884	1,131
	D_2006[b]	2,461	1,891	1,301	,193	,198	5,041
	D_2007	5,329	1,930	2,762	,006	,188	5,321
	D_2008[b]	2,504	1,891	1,324	,186	,183	5,466
	D_2009	5,741	1,918	2,994	,003	,204	4,900

a. Dependent Variable: Change_share

b. Removing the insignificant dummies does not change the results of the other variables notably.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,150[a]	,022	,021	23,7812654

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	57685,115	8	7210,639	12,750	,000[a]
	Residual	2506511,326	4432	565,549		
	Total	2564196,441	4440			

Table 2, Regression II

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	-6,771	1,933	-3,503	,000		
	Change_Spoli	-,139	,047	-2,950	,003	,790	1,266
	Change_Seco	,025	,041	,605	,545	,603	1,657
	Change_Leco	,279	,071	3,947	,000	,667	1,500
	Change_Buev	-,049	,052	-,935	,350	,868	1,152
	Wage_USD_change	,149	,048	3,065	,002	,690	1,448
	GDPLAG_change	,823	,160	5,137	,000	,730	1,370
	Change_euro	-,300	,146	-2,059	,040	,982	1,018
	D_2006	3,749	1,949	1,924	,054	,188	5,322
	D_2007	7,057	1,955	3,609	,000	,185	5,416
	D_2008	4,423	1,941	2,279	,023	,175	5,712
	D_2009	8,899	2,083	4,272	,000	,178	5,604

a. Dependent Variable: Change_share

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,170[a]	,029	,027	23,7971533

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	73812,085	11	6710,190	11,849	,000[a]
	Residual	2472485,464	4366	566,305		
	Total	2546297,549	4377			

Table 3, Regression I

Coefficients[a]

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	-6,378	1,892	-3,371	,001		
	Risk_change_Growth	,396	,077	5,127	,000	,237	4,222
	Wage_change_Growth	-,002	,078	-,028	,977	,658	1,520
	Total_Risk_Change	-,232	,066	-3,514	,000	,197	5,072
	Wage_USD_change	,187	,050	3,782	,000	,379	2,638
	GDPLAG_change	,859	,156	5,496	,000	,741	1,350
	Change_euro	-,074	,088	-,843	,399	,830	1,205
	D_2006	3,363	1,894	1,775	,076	,197	5,087
	D_2007	6,179	1,938	3,189	,001	,185	5,395
	D_2008	3,262	1,892	1,725	,085	,182	5,502
	D_2009	8,031	2,010	3,996	,000	,185	5,413

a. Dependent Variable: Change_share

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,169[a]	,029	,026	23,7124280

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	73299,402	10	7329,940	13,036	,000[a]
	Residual	2490897,039	4430	562,279		
	Total	2564196,441	4440			

Table 3, Regression II

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	-6,271	1,864	-3,364	,001		
	Risk_change_Growth	,411	,065	6,326	,000	,331	3,017
	Total_Risk_Change	-,246	,052	-4,756	,000	,178	5,613
	Wage_USD_change	,186	,044	4,191	,000	,226	4,433
	GDPLAG_change	,857	,155	5,545	,000	,722	1,385
	D_2006	3,239	1,870	1,732	,083	,198	5,038
	D_2007	6,115	1,917	3,190	,001	,186	5,366
	D_2008	3,140	1,869	1,680	,093	,183	5,466
	D_2009	7,929	1,941	4,086	,000	,195	5,129

a. Dependent Variable: Change_share

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,169[a]	,029	,027	23,5637489

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	73629,087	8	9203,636	16,576	,000[a]
	Residual	2491407,933	4487	555,250		
	Total	2565037,020	4495			

Table 4, Regression I

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	-6,506	1,940	-3,354	,001		
	Change_Spoli	-,202	,053	-3,788	,000	,620	1,614
	Change_Seco	-,057	,052	-1,093	,274	,376	2,657
	Change_Leco	,099	,088	1,127	,260	,428	2,336
	Change_Buev	-,028	,053	-,524	,600	,834	1,198
	C_Spoli_growth	,289	,124	2,328	,020	,410	2,437
	C_Seco_growth	,010	,098	,098	,922	,186	5,372
	C_leco_growth	,487	,160	3,040	,002	,289	3,457
	C_buev_growth	-,330	,278	-1,186	,236	,913	1,095
	Wage_change_Growth	,067	,082	,819	,413	,595	1,681
	Wage_USD_change	,139	,055	2,518	,012	,531	1,882
	GDPLAG_change	,934	,162	5,774	,000	,713	1,402
	Change_euro	-,258	,147	-1,760	,079	,967	1,034
	D_2006	3,655	1,946	1,878	,060	,188	5,328
	D_2007	7,078	1,963	3,607	,000	,182	5,481
	D_2008	3,678	1,949	1,887	,059	,173	5,781
	D_2009	9,954	2,156	4,616	,000	,166	6,031

a. Dependent Variable: Change_share

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,185[a]	,034	,031	23,7443411

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	87593,073	16	5474,567	9,710	,000[a]
	Residual	2458704,475	4361	563,794		
	Total	2546297,549	4377			

Table 4, Regression II

Coefficients[a]

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error			Tolerance	VIF
1	(Constant)	-6,604	1,934	-3,415	,001		
	Change_Spoli	-,215	,053	-4,081	,000	,629	1,591
	Change_Leco	,088	,087	1,009	,313	,434	2,305
	C_Spoli_growth	,284	,109	2,615	,009	,538	1,860
	C_leco_growth	,464	,141	3,301	,001	,376	2,662
	Wage_change_Growth	,059	,082	,726	,468	,598	1,672
	Wage_USD_change	,139	,055	2,521	,012	,532	1,878
	GDPLAG_change	,941	,161	5,846	,000	,720	1,389
	Change_euro	-,242	,146	-1,652	,099	,970	1,031
	D_2006	3,866	1,923	2,010	,044	,192	5,210
	D_2007	7,119	1,956	3,640	,000	,183	5,462
	D_2008	3,890	1,935	2,010	,045	,175	5,720
	D_2009	10,308	2,120	4,863	,000	,171	5,833

a. Dependent Variable: Change_share

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,184[a]	,034	,031	23,7409015

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	86090,236	12	7174,186	12,729	,000[a]
	Residual	2465319,390	4374	563,630		
	Total	2551409,625	4386			