Intra-industry trade between Sweden and Russia

Master thesis within Economics
Authors: Johanna Eliasson
Tutors: Research fellow Lars Pettersson
        Ph. D candidate Charlotta Mellander
Jönköping  June 2008
Master's thesis within Economics

Title: Intra-industry trade patterns – a study of Sweden and Russia

Authors: Johanna Eliasson

Tutors: Lars Pettersson, Research fellow
        Charlotta Mellander, Ph. D Candidate

Date: 2008-06-10

Keywords: Intra-industry trade, Russia, Sweden, Grubel-Lloyd index

Abstract

The purpose of the thesis is to determine whether Russia has changed its intra-industry trade pattern with Sweden between the years of 1997 and 2003. To be able to see any changes five products, vehicles, grain, forest, optical instruments and jewellery has been chosen. With the Grubel-Lloyd index the products will be analysed and the index will also measure the extent of the intra-industry trade between Sweden and Russia.

Theories predict that countries with similar factor endowments and income tend to have a two-way trade which would indicate that Russia is starting to catch up to the industrialised countries, in this thesis that would be Sweden. The theory of income effects predicts that when consumers are getting a larger budget they will start to move away from the most necessary goods and towards more luxury good consumption.
# Table of Contents

1 Introduction ............................................................................................................. 1  
1.1 Purpose ............................................................................................................... 1  
1.2 Limitations ......................................................................................................... 2  
1.3 Background ....................................................................................................... 2  
1.4 Disposition of the thesis .................................................................................. 3  

2 Theories of intra-industry trade .......................................................................... 4  
2.1 Determinants of intra-industry trade ................................................................ 4  
2.1.1 Intra-industry trade and market structures .................................................. 4  
2.1.2 Intra-industry trade and economies of scale .............................................. 5  
2.2 Horizontal vs. vertical intra-industry trade ...................................................... 7  
2.3 Overlap in trade and the Linder hypothesis .................................................... 7  
2.4 Sectoral composition in Russia ........................................................................ 8  
2.5 Income substitution and the effect on trade patterns .................................... 8  
2.6 Summary ........................................................................................................... 9  

3 Trade model .......................................................................................................... 10  
3.1 Grubel-Lloyd Index .......................................................................................... 10  
3.2 Other measurements ......................................................................................... 11  

4 Empirical findings and analysis ......................................................................... 12  
4.1 The data ............................................................................................................ 12  
4.2 Country comparison and the industries ........................................................... 12  
4.3 The intra-industry trade between Sweden and Russia .................................... 14  

5 Conclusions and suggestions for further research ........................................ 17  

References ............................................................................................................. 18
1 Introduction

Russia, being a hot topic today both in the media as well as in economic discussions, is an emerging country with great natural resources and growing importance in the world economy. Even though Russians has reasons to celebrate the economic recovery they have made so far there is still much to carry out before they can really take up the competition with the already developed countries. One recommendation from the World Bank (2005) for Russia to achieve this objective advises Russia to maximize economic growth which is an effective way of fighting poverty, and to diversify away from natural resource production and getting away from the Dutch disease.

Trade is said to be one important factor for a country’s further economic growth, welfare and development; it is actually a belief that economists from both the left and the right side can agree upon (Dollar and Kraay, 2004). It is also supported by the standard neoclassical trade argument that claims a positive impact of exports and trade on the country’s economic performance since it allows for a better allocation of resources (Ram, 1985). The reallocation of resources will lead to an increase in national income and thus, hopefully, reduce poverty (Helpman and Krugman, 1985). It will also allow Russia to produce on its production frontier instead of inside it; as is, and this will lead to an efficiency gain (World Bank, 2005).

When speaking about trade one also has to mention the concepts of integration and globalisation since these seem to be connected to each other. The importance of integration and globalisation has been generally recognised, and in particular its economic aspects. The integration between countries, and in particular economic integration, is said to raise both wealth and welfare of countries. Not least of all does this apply to the intra-industry trade. A large share of the trade between the world economies is on the intra-industry level, and according to Parjanne (1989) intra-industry trade is more than half of the trade between the industrialised countries. This is also supported by empirical studies which have indicated that trade could not only depend on comparative advantages. The two most outstanding pieces of evidence to this are the facts are that trade occurs between countries with similar factor endowments, and a large part of the trade is within the intra-industry trade (Krugman, 2000). This is precisely the opposite of what the most fundamental trade theories tell us. Both the Ricardian and the Heckscher-Ohlin model argue that countries will specialise and export goods in which they have a comparative advantage and the more countries differ, the more trade will occur.

The world has grown smaller; the trade liberalisation has run through the world and created a larger market for goods and services. During the last ten years the liberalisation has also reached into the countries of the former Soviet Union, and they have now become a part of the global market economy.

1.1 Purpose

The purpose of the thesis is to analyse, at two different points in time, the export flows between Russia and Sweden. Has the intra-industry trade changed over the years and does

---

1 The definition of intra-industry trade is the simultaneous import and export of goods in the same industry (Bernhofen, 1997).
that tell us anything about the change in Russia's economic system? The statistical data has been limited to investigating five different product groups: forest, vehicles, jewellery, grain and optical instruments. The commodity groups are carefully chosen and represent both normal goods (such as grain and forest) and luxury goods (such as jewellery, and optical instruments).

1.2 Limitations

The analysis has been made on data from the years of 1997 and 2003 just to avoid the earlier years of transition and inaccurate data (Kandogan, 2003). The output data for all the transition economies are strongly biased because of, at least, two reasons: the first one is that the relative prices changed very rapidly and that has likely made the growth rate heavily dependent on a base period; and secondly, the official statistics report in more detail in the declining state sector than in the growing private sector. These two incorrect measures tend to overrate economic declines and understate growth (Fischer, Sahay and Végh, 1996).

This thesis starts off with the assumption that Russia is still an economy in transition, i.e. that its resources are not efficiently allocated and that the economy is still suffering from the legacy of central planning.

1.3 Background

When thinking of international trade one instantly thinks of inter-industry trade. But intra-industry trade is claimed to be, by Ruffin (1999) among others, more beneficial than inter-industry trade. Since intra-industry trade allows companies to benefit from economies of scale because of how larger markets open up. The intra-industry trade stimulates innovations which are just because the intra-industry trade allows larger markets to be created.

The interest in this topic lies within the fast evolving economy that Russia constitutes, and also the fact that the economy has made a remarkable recovery and transformation to a market economy. The interest also lies within the steadily increasing two-way trade over the years that have been empirically significant.

The history of Russia is something out of the ordinary; one may call it a social experiment. Its ups and downs have been followed by critical eyes from the rest of the world since it is one of the most important countries in the world. The transition is a unique historical event and is by that fact a hard topic to analyse since it has never happened before and one cannot predict what is going to happen next (Sutela, 2003).

After the collapse of the Soviet Union the trade patterns have changed significantly within Russia and the former member countries of the Soviet Union, going from only trading within the Union, to opening up the economy for trade with the rest of the world. Before the late 1980s, foreign trade was only of secondary importance in the economy of Russia (Tabatchnaia-Tamirisa, 1996). The import substitution and the image of self-sufficiency limited trade with countries outside the Soviet Union. This led to a lag in technology compared to the outside world and a serious inefficiency throughout the whole economy that Russia still suffers from today. The firms in Russia had long enjoyed a protective environ-

---

2 Each country exports goods the most suited to its factor endowment and climate and imports goods least suited for its national features (Ruffin, 1999).
ment and the collapse of the central planning it was a great shock and Russia’s competitiveness on the world market was low, the economy was in no shape for the competitive market. The economy was also limited by misallocation of resources and the production of low-quality goods.

In 1989 the trade liberalisation of Russia began with Mikhail Gorbachev when he started to dismantle the state-run trade monopoly. After some rough years in the beginning of the 1990s the Russian economy has during the early years of the 21st century started to grow with an impressing pace; the growth in GDP has annually been somewhere around 7-10 per cent. In the excitement over both India and China’s growth and increasing action in the world economy, Russia’s improvements get lost (Sävborg, 2007). The Russian economy has, between the years of 1998 and 2006, made an impressive performance by expanding their GDP by 57 per cent (World Bank, 2005). But the economic growth of Russia has been viewed as unstable since it is heavily dependent on its oil export, where the oil price fluctuations has a significant impact on the growth. It is because of the volatility in the oil prices that Russia has been recommended to start developing other industries such as manufacturing since other industries are less sensitive to terms-of-trade shocks. As a fact, Russia is strongly dependent on trade with EU-15, and with the help of its trading partners Russia has a good chance of changing its export pattern (Pospieszna, 2006). Diversification of products, here most important diversifying away from natural resource production, is also an important factor when supporting the sustainable growth in Russia (World Bank, 2005).

The relationship between Sweden and Russia goes a long way back in history and was often one of war but the two countries are now close trading partners.

The economic relationship between Sweden and Russia is rapidly solidifying, the trade rose by 386% between 1999 and 2005. Sweden is also one of the ten largest investors in Russia (Embassy of Sweden in Moscow, 2007).

1.4 Disposition of the thesis

The following section, Section 2 presents the relevant theories used to analyse the hypothesis of the thesis, trade theories such as income substitution, market structures and economies of scale are explained and made to fit into the purpose of this thesis. In Section 5 the most suitable method is presented for analysing the data, which is the Grubel-Lloyd index. Other indices are also presented. Section 4 is where one can find the empirical result and analysis. Section 5 is where the final conclusions lie and also some suggestions for further research within this topic.
2 Theories of intra-industry trade

The real significance of intra-industry trade came with the publication of Grubel and Lloyd, Intra-industry Trade: the theory of Measurement of International Trade in Differentiated Products, in 1975 in which they also presented the overlap method which will be further presented in Section 2.3. The flow of intra-industry trade can also be called a trade overlap which is also described as export and import of similar goods of a specific commodity and is mainly occurring between developed countries (Bowen, Hollander and Viaene, 1998).

International trade depends initially on how similar two countries are in their endowments. The more similar to each other two countries become in the sense of income and factor endowments, trade develops toward the intra-industry trade (Bergstrand, 1985). Gusev (2007) also suggests that intra-industry trade between two countries is the evidence of two countries’ mutual integration.

A two-way trade, such as intra-industry trade, will occur since the two different countries produce slightly differentiated products and will hence satisfy the consumer’s different tastes (Krugman, 2000). Another prerequisite that is leading to a more intense trade between countries is, according to Burenstam Linder (1961), similar demand structures, also known as the Linder hypothesis, more on that in Section 2.4.

The theory of intra-industry trade contradicts the classic trade theories of Ricardo and Heckscher-Ohlin where countries benefit and trade with each other when they have a comparative advantage in producing some good. This way of trading is called inter-industry trade, which is defined as the trade in different goods, produced with different production technologies (Krugman and Obsfeldt, 2000). A key assumption is the demand for a lot of varieties in goods, also called “love for variety”, where the consumer wants many different products to choose between (Gullstrand, 2002). One can assume that there are certain products that consumers like to consume in many varieties, so the value of the variety is valued on its own right (Helpman and Krugman, 1985).

Burenstam-Linder wrote in 1961 that it is of crucial importance that the good is firstly developed in the home market before it is exported to other markets, if there is no domestic demand for the good there could not be a success abroad either. When the product is established in the home market it is possible to sell to other, more distant markets. Countries should, according to Burenstam Linder and logical assumption, start to trade with countries of similar preferences. One would therefore expect countries of high income to trade with high-quality products and low income countries to trade with low-quality products.

Distance is suggested by Grubel and Lloyd (1975) to have a negative impact on intra-industry trade; countries sharing boarders have a larger share of intra-industry trade. This is because of the associated transport cost, and being particularly high for some products.

2.1 Determinants of intra-industry trade

2.1.1 Intra-industry trade and market structures

Intra-industry trade can be observed under three different market structures: perfect competition, oligopoly and monopolistic competition, but when talking about Russia one needs only to consider the latter two market structures. The existence of economies of scale at the level of the firm is not consistent with the non-negative profit, and that implies that the market is not a perfect competition (Helpman and Krugman, 1985). Both economies of
scale and the differentiation of products are important for the trade to take on the intra-industry trade pattern.

Under oligopoly the produced goods are homogenous in both countries such that the domestic market is identical with the foreign market. To make trade occur the markets have to be segmented, otherwise the firms will not be able to discriminate their home market (Krugman, 2000).

In monopolistic competition the industry benefits from increasing returns to scale while other industries produce at constant returns to scale. The goods that are produced are industry specific, not country specific, and it is the same generic goods. However, every firm has its own niche or position on the market, and since the products are slightly different from each other the firm has some control over the prices (Ruffin, 1999). According to Gusev (2007) an explanation of intra-industry trade’s existence is applying the monopolistic model and admitting scale economic’s presence.

2.1.2 Intra-industry trade and economies of scale

In the intra-industry trade the most important economy of scale is the increasing kind (Hansson, 1989). When a firm benefits from economies of scale and monopolistic competition, foreign trade means an expansion of the market area. This will lead to an increase in output and cutting the expenses of production because of the scale economy. When a firm starts to produce a specific variety of products it has most often increasing returns in production. One can conclude that economies of scale are essential for intra-industry trade to develop (Krugman, 2000). Scale economies will stimulate the investments when improving the production. An improved production will not only reduce costs per unit of output when the production increases but it will also give the firm a technological monopoly in manufacturing a specific product. When a firm is holding such a technological monopoly it will raise the whole industry’s competitiveness on the global market which will increase both the quality and quantity of the product (Gusev, 2007).

A high intensity of international intra-industry trade supports the innovation development and the economy’s integration with the world economy; when producing a great variety of varieties the general knowledge of technology will increase. On the other hand, a low intensity of intra-industry trade is a sign of a low technological share (Ruffin, 1999).

Another assumption that can be made regarding the economies of scale is that it increases with the quality. There are two justifications for this: the first reason is that high-quality products have fewer close substitutes than low-quality products, and the second is that fixed costs for product development seems to be more important for high-quality varieties (Greenway and Torstensson, 1997).

Another important factor for intra-industry trade to arise is to allow products to be differentiated since consumers want as many varieties as possible and as the number of differentiated products increases, the consumer utility increases with it (Dixit and Stiglitz, 1977). The biggest challenge for firms is to produce something that is different from the already existing products in the same product group. If the products are differentiated, both the countries engaging in intra-industry trade will benefit. If the countries are not benefiting from the trade it can be a sign of the countries not being enough alike each other.

One caveat must be made here: in production economies of scale may have a large impact on the selection of the destinations of exports. There are fixed cost in the production of
exports and it puts a limit on the size of the market of the importing country to overcome the fixed costs and make gains from trade.

Figure 1 shows the trade development and economies of scale, it gives an explanation to the existence of intra-industry trade. When a firm produces in a monopolistic competition with economies of scale present, any foreign trade expansion means an expansion of the market and sales area. The results from the expansion of the market will lead to an increase in the production of the commodity and also a cut in expenses due to the economies of scale advantage. The new global competition will make the firm specialize in a certain product. The scale effect will increase the pace on the recoupment on production cost, stimulating the investments in the improvement of production. An improved product gain shares on the global market mainly because of the technological monopoly that the firm is holding thanks to the reinvesting. A technological monopoly raises a firm’s competitiveness on the global market, and its products will also have a higher quality and be produced in a greater quantity.

Figure 1 Intra-industry trade development and economies of scale

Source: Gusev, 2007


2.2 Horizontal vs. vertical intra-industry trade

Products can be differentiated in two ways; vertically and horizontally. The theories of horizontal and vertical intra-industry trade lead to contradicting hypotheses (Gullstrand, 2002). Horizontal intra-industry trade arises between two countries that are trading goods of similar quality, but with different attributes or characteristics. Horizontally differentiated products have identical production technologies while vertically differentiated products imply a difference in the production process (Lancaster, 1979). These assumptions are important when distinguishing between a two-way flow of similar products and similar quality and a two-way flow of similar products and different quality, the latter being vertical intra-industry trade (Gullstrand, 2002).

From the available data it is difficult to know if it is a vertical or a horizontal trade, but one can assume that it is a vertical intra-industry trade since one can presume that Sweden and Russia do produce their products in different ways. Gullstrand (2002) supports this with his dissertation results saying that intra-industry trade consists of vertical exchange; this has gained empirical support from many studies lately.

Since intra-industry trade is referred to as the simultaneous import and export of differentiated products within the same product group or industry the all the goods in the selected groups have different combinations of characteristics, but still have some in common (Parjanne, 1989).

2.3 Overlap in trade and the Linder hypothesis

The Linder hypothesis is drawn from the speculation of increasing trade between two countries when they have similar demand structures. The most used way of testing this hypothesis is to use per capita income as a proxy for demand. This is not the best indicator since we know from consumer theory that consumer demand is changing with the level of income. This means that aggregate demand is not only affected by the average of income, but also how income is distributed (Bohman and Nilsson, 2007). Burenstam Linder (1961) acknowledges this by claiming that the biased income distribution in a country will broaden the range of potential exports and imports and result in a greater overlapping of demands between countries with different per capita income than would be the case if the incomes were more evenly distributed.

This leads to the Linder hypothesis claiming that countries will trade with countries that have similar demand structures. The study made by Bohman and Nilsson (2007) even shows that the similarity of the demand structure is even more important when dealing with differentiated goods than homogenous ones. The most common way of testing whether two countries have similar demand structures is to compare the average income of each country (Burenstam Linder, 1961). If the differences between the two countries are small, one can expect a high level at trade. This scheme has the clear advantages of being easy to estimate since the data of country average income is easy to access. But on the other hand, it does not take in to account how the income is distributed. One good example of a demand overlap is the trade between Sweden and Finland, on the flip-side two countries with a small overlap in demand structures are Uzbekistan and Luxembourg.3

---

3 Results taken from the study made of Bohman and Nilsson (2007. The results are calculated from average income between countries in 2000.
2.4 Sectoral composition in Russia

There are hypotheses that the sectoral composition of market economies changes in a predicted way as the economy grows larger and richer. This hypothesis predicts three different stages of changes. The first sign of change is a declining agricultural sector; secondly a rise in the industry share and then stagnation until employment in the heavy industry starts to decline; lastly the share of services increases. There are at least two reasons why this pattern is highly relevant for Russia: first of all, since the economy has not been shaped by market forces but rather by the political mandate it is likely to end up with a sectoral structure. This sets it apart from its counterparts at comparable per capita income levels. The other reason is the vast reallocation problems that Russia is facing (World Bank, 2005).

After the rapid industrialisation of the socialist period the transition began, and the centrally planned economy was facing a larger share of employment in industry and a smaller share in agriculture than other market economies with similar income levels. Also, market-oriented services had a low share of employment since it used to be the planner of the economy that decided over the market and not the market itself. From this one would expect to observe, on average, the level of employment in the industry sector to decrease significantly and the market services to increase by a significant amount (World Bank, 2005).

2.5 Income substitution and the effect on trade patterns

The degree of intra-industry trade between countries is generally decided by the average income level of the country. Countries with higher than average income level trade more intra-industry compared to countries with a lower average income level (Burenstam Linder, 1961). Consumer theory is consistent with this when it says that consumers with a higher income prefer a larger variety of goods (Bohman and Nilsson, 2007).

When the income of a consumer is increased there is going to be an outward shift in the budget line; the purchasing power of the consumer is changing. This increase can lead to either an increase or a decrease in demand depending on the character of the good (i.e. if it is a normal or an inferior good). When increasing ones income there is also a change in the consumption patterns. The amount of inferior goods purchased will decrease if the income effect is sufficiently strong, and consumers will buy less of the good as it becomes cheaper. The increase in income increases the purchase of normal goods. As the income of the population keeps increasing above a certain level the consumption will start substituting towards luxury consumption and imported goods.

The substitution effect pivots the budget line around the indifference curve, leaving the consumer on the same indifference curve. This gives the new consumption basket, when the consumer is substituting towards the normal good that is now comparatively cheaper. And then the income effect is coming and shifting the whole budget line and the consumer can now enjoy a new indifference curve.
2.6 Summary

The intra-industry trade theory is contradicting the classical trade theories, such as the Ricardoian and Heckscher-Ohlin model, where trade is said to occur when countries are different and are specializing in the production of the goods they have a comparative advantage in. Intra-industry trade, on the other hand, depends on the similarities in the factor endowments, the more alike two countries are, the more two-way trade and mutual integration.

Another advantage with intra-industry trade is that international trade does not require the disallocation that is associated with inter-industry trade, but intra-industry trade does not imply a just trade policy. One truth is that much of the intra-industry trade takes place under an imperfect competition such as monopolistic competition or oligopoly.

Economies of scale are fundamental for intra-industry trade; markets will open up and enlarge which will lead to consumers having a broader variety of products to choose between than before.

When the income is increasing people will tend to buy less of the inferior goods and more of the normal and luxury goods.

Table 2-1 Expected effects on intra-industry trade

<table>
<thead>
<tr>
<th>Country specific</th>
<th>Effect</th>
<th>Industry specific</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Similar GDP</td>
<td>+</td>
<td>Economies of scale</td>
<td>+</td>
</tr>
<tr>
<td>Similar factor endowments</td>
<td>+</td>
<td>Differentiated products</td>
<td>+</td>
</tr>
<tr>
<td>Distance</td>
<td>-</td>
<td>Similar per capita income</td>
<td>+</td>
</tr>
</tbody>
</table>
3 Trade model

In this Section the Grubel-Lloyd index is presented which is the most common, and has become somewhat of a standard measurement when determining the level of intra-industry trade. Section three also presents other indices that measure intra-industry trade and its strengths and weaknesses.

3.1 Grubel-Lloyd Index

The index is often used to measure intra-industry trade patterns, Kol and Mennes (1985) have in their article compared different indices and came to the conclusion that the Grubel-Lloyd index was the most suitable one to use in the case of intra-industry trade. Bergstrand (1985), among others, argues that the Grubel-Lloyd index gives the best result using bilateral trade instead of multilateral trade.

The index also covers an overlap in trade, discussed in Section 2.3. The Grubel-Lloyd index is developed from the equation of both intra- and inter-industry trade. The index is measuring the intra-industry trade which is the same as the total trade for the industry \((X_i + M_i)\) minus the net value of the trade (export or import) of the particular industry \(i |X_i - M_i|\).

\[
\text{Inter-industry trade} = |X_i - M_i| \\
\text{Intra-industry trade} = (X_i - M_i) - |X_i - M_i|
\]

\[
GL_i = \frac{(X_i - M_i) - |X_i - M_i|}{(X_i + M_i)} \quad \text{Equation 3-1}
\]

Rewriting equation 3-1 will give

\[
GL_i = 1 - \left( \frac{|X_i - M_i|}{X_i + M_i} \right) \quad \text{Equation 3-2}
\]

Where \(X_i\) is the export of industry \(i\) and \(M_i\) is import of industry \(i\). The numerator is the value of the intra-industry trade of industry \(i\). The \(GL_i\) index measures to what extent the trade is intra-industry trade, the index takes on a value between 0 and 1 where \(GL_i = 0\) (\(X_i\) or \(M_i\) = 0) indicates the total specialisation of a country’s trade (inter-industry trade) and \(GL_i = 1\) (\(X_i = M_i\)) shows a complete intra-industry character of the foreign trade. Also here do Grubel and Lloyd (1975) comment on the fact that the index is not only predicting trade and production, but also the similarity between two countries of commodity export and production.

One major draw-back with the Grubel-Lloyd index is the categorical aggregation problem (Grubel and Lloyd, 1975). It is the problem of goods that are produced with different factor ratios being in the same statistical group; this will make the index overvalued. This is not only a problem within the intra-industry trade; it appears as well in the revealed comparative advantage and in some of the other trade indices. The categorical aggregation comes about from two reasons: the first reason is from the overvaluation of the index, this will happen if there are sub-groups within the category that suffer from a trade imbalance of opposite signs. The other reason is a weighting effect which could cause the index to be
distorted. If one decides to ignore these problems, it can be the case that we are explaining nothing but a random number. But on the other hand, the categorical aggregation and random errors cannot explain the growth in the intra-industry trade in the industrialized countries (Parjanne, 1989).

Another drawback is that the index is not linear. A constant increase in exports (or imports) will lead to a, under a given level of import (export), diminishing value of the Grubel-Lloyd index. The index is neither dependent on the absolute values of exports nor imports since intra-industry trade is calculated as a fraction of the industry’s total trade (Parjanne, 1989).

### 3.2 Other measurements

Balassa calculated representative ratios in his study on trade expansion within the EU. He defined the measure of trade matching at a given level of aggregation as

$$D_i = \frac{|X_i - M_i|}{|X_i + M_i|}$$

Where, just as in the Grubel-Lloyd index, $X_i$ and $M_i$ are the value of exports and imports in industry $i$, with $0 \leq D_i \leq 1$. $D_i$ then measures the share of net trade, $(X_i + M_i)$, in the total volume of trade, $|X_i - M_i|$. The smaller the index is the larger are the shares of intra-industry trade. According to this index all industries are given equal weight even though some industries are considered more important than others in total trade (Parjanne, 1989).

Michely used an index that is similar to the Grubel-Lloyd index to study the commodity composition of exports and imports:

$$\bar{F}_i = 1 - 0.5 \sum_i \left| \frac{X_i}{\sum X_i} - \frac{M_i}{\sum M_i} \right|$$

This Michely index measures the proportion of an industry’s exports in the total export, and it is matched by the corresponding proportion of imports. A high index means that the trade is similar in the commodity composition. But the Michely index does not measure the trade overlap; instead it is measuring the similarity of trade patterns of an individual country (Parjanne, 1989).
4   Empirical findings and analysis

4.1   The data

The data used in this thesis have been collected from Statistics Sweden (SCB) and covers Sweden’s export and import of selected goods with Russia. The comparison of the data is between 1997 and 2003, the reason for not including more years in the study is because of the data constraints. The data is measured in the Swedish currency (SEK).

Five groups of products have been chosen for study and are classified at a four digit level of the KN-system. Five industries are examined: grain (1001 – 1004), forest (4403), vehicles (8703), luxury goods in the form of jewellery (7113 – 7115) and optical instruments (9018 and 9022). Both import and export data have been considered since both are needed to conduct the Grubel-Lloyd index. To see if there has been a change in the intra-industry trade, two years have been selected for comparison: 1997 and 2003. The thought behind the chosen industries apart from comparing the two years is also to compare the trade with ‘normal’ and ‘luxury’ goods to be able to see if there has been a change in consumption patterns. ‘Manufactures’ has in earlier research proven to be the consumption group that is the most frequent one in a two-way trade. This fact was also considered when selecting the different commodity groups for testing. The reason for not using an even finer data of 6 or 8 digits, is because of the risk of only covering one-way trade where the Grubel-Lloyd index would be of limited usage.

Many economists have criticised the usage of to disaggregated data since it is too rough and will make the index decrease. One has to agree to some point, but on the other hand it is not likely to define intra-industry trade out of existence. Many earlier studies have used a low level of aggregation. Trade data is, on a more disaggregated level, less reliable and less representative (Parjanne, 1989).

4.2   Country comparison and the industries

There are significant differences between Sweden and Russia: some differences are more obvious than others such as the difference in size of the countries and the size of the two populations. The history of Russia has made its impact on the country’s economic development and restricted the economy from evolving at the same rate as the other western countries. There is also the ‘curse of natural resources’ that Russia has to fight against. The negative relationship between resource abundance and economic growth is a well documented phenomenon even though it seems like a contradicting relationship (Kronenberg, 2004). Table 4-1 shows some numerical differences between Sweden and Russia, it also shows a comparison between the years of 1997 and 2003.
**Table 4-1 Country comparison between 1997 and 2003**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Russia 1997</th>
<th>Russia 2003</th>
<th>Sweden 1997</th>
<th>Sweden 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>147.3 million</td>
<td>145.5 million</td>
<td>8.8 million</td>
<td>8.9 million</td>
</tr>
<tr>
<td>GDP (current US$)</td>
<td>404.9 billion</td>
<td>431.4 billion</td>
<td>249.4 billion</td>
<td>304.1 billion</td>
</tr>
<tr>
<td>GNI per capita (current US$ and PPP)</td>
<td>6 390</td>
<td>9 420</td>
<td>21 280</td>
<td>28 680</td>
</tr>
<tr>
<td>Exports of goods and services (% of GDP)</td>
<td>25</td>
<td>35</td>
<td>41</td>
<td>44</td>
</tr>
<tr>
<td>Imports of goods and services (% of GDP)</td>
<td>23</td>
<td>24</td>
<td>34</td>
<td>37</td>
</tr>
<tr>
<td>Area (sq. km)</td>
<td>17,075,400</td>
<td>449,964</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: World Bank (WDI, 2008)

It is a general trend one can see in Table 4-1: the trend of improvement. All the measures have increased except for the Russian population which is actually decreasing. Even though Russia is significantly larger than Sweden the GDP for 2003 shows that Sweden is not that far behind. One can see the difference in income per capita in the row for GNI (gross national income), here is where one can really tell the difference between the two countries. The numbers for 2003 shows that the GNI per capita in Sweden is three times as high as the Russian GNI, even though the Russian GNI has increased with 47 percent over six years. This tells a lot about the wealth in the two economies. Russia’s export has grown from 25 percent of GDP to 35 percent of GDP and this growth is larger than the one observed for Sweden under the same time period. The imports to Russia still seem to be restricted and the focus is obviously on the exports.

The natural resource curse seems to be crowding out other activities that are crucial to the economic growth; this activity seems to be manufactures. The benefits from natural resources only accrue the wealthiest part of the population which is only trying to imitate the Western consumption patterns, instead of investing them in something with a higher social return (Kroneberg, 2004).

The fall of the Soviet Union was a dramatic fall for the forest industry. It led to a breakdown of the interrelations inside the industry. The fall in demand for forest-related products just led to a worsening of the crisis. When the Ruble was devalued in 1998 the demand for imported forest-related products decreased, which gave the domestic companies a chance to increase output. Forest products are important for Sweden since it is such a large part of the natural resources. The amount of unprofitable companies in the sector was 71 percent in 2000 (Efremov, 2001). The forest in Sweden has always been a key industry and only Canada and Finland export more forest-related products than Sweden. What is significant for the Swedish industry is that it is a strong economic cluster and work closely together with other industries and can therefore easily make use of the specialized knowledge and employees.

The vehicle market in Russia is a particular promising one; in 2003 2.3 million new cars were sold and placed Russia among the top-10 automotive markets. The domestic producers supply about 70 percent of the market demand and the vehicle market is restricted, with tariffs, for foreign made products (European Bank for Reconstruction and Development, 2008). The automotive industry in Sweden is one of the most important ones, representing 14 percent of the total merchandise export in 2004, and nine of ten Swedish-produced vehicles are sold abroad (Price Waterhouse Coopers, 2005).
Sweden exports about 20 percent of the grain during a normal year (Lantmännen). The Russian agriculture sector is recovering and transforming from being a central planned economy to a more market-oriented one. The break up of the Soviet Union lead to large state farms losing heavy government subsidies which lead to declines in production for about ten years (Foreign Agriculture Service, 2003).

The jewellery industry is regarded as a luxury good industry in this thesis, which is a good that is bought first after all the basic needs are fulfilled. A luxury good is not obeying under normal economic laws of demand. When the price of a luxury good increases the demand for it will also increase. It is the same pattern for optical instruments; they can also be viewed as a luxury good, a more technical one.

### 4.3 The intra-industry trade between Sweden and Russia

Below in Table 4-2 the results from the calculated Grubel-Lloyd formula for the five product groups are presented. The intra-industry trade of grain in 1997 cannot be reported since Sweden did not have any imports of grain from Russia at that time.

<table>
<thead>
<tr>
<th>Good</th>
<th>IIT 1997</th>
<th>IIT 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain</td>
<td>0.000</td>
<td>38.9%</td>
</tr>
<tr>
<td>Vehicles</td>
<td>1.1%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Forest</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Optical instrument</td>
<td>3.4%</td>
<td>7.5%</td>
</tr>
<tr>
<td>Jewellery</td>
<td>7.8%</td>
<td>11.2%</td>
</tr>
<tr>
<td><strong>Σ</strong></td>
<td><strong>12.3%</strong></td>
<td><strong>58.3%</strong></td>
</tr>
</tbody>
</table>

The other hypothesis is constructed to see if the trade has changed over the seven years.

Table 4-3 also shows the difference between 1997 and 2003’s intra-industry trade to see whether the characteristics of the intra-industry trade have changed or not. Grain has made a strong improvement, going from zero to approximately 39 percent. Vehicles is the only commodity group that has decreased in the intra-industry trade, the other four groups of commodities have grown over the seven years. The largest improvement in the intra-industry trade can be seen in optical instruments, which has increased by 4 percent. The two-way trade with jewellery has increased with 3.4 percent over the same period.

<table>
<thead>
<tr>
<th>Good</th>
<th>IIT 1997</th>
<th>IIT 2003</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain</td>
<td>0</td>
<td>38.9%</td>
<td>+38.9%</td>
</tr>
<tr>
<td>Vehicles</td>
<td>1.1%</td>
<td>0.7%</td>
<td>-0.4%</td>
</tr>
<tr>
<td>Forest</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Optical instrument</td>
<td>3.4%</td>
<td>7.5%</td>
<td>+4.1</td>
</tr>
<tr>
<td>Jewellery</td>
<td>7.8%</td>
<td>11.2%</td>
<td>+3.4%</td>
</tr>
</tbody>
</table>

Bilateral trade is known for stimulating an economy’s economic growth, and opening up trade with foreign countries and opening up for international competition has many posi-
tive effects such as an increased efficiency of production, possibilities of gaining from economies of scale and in the end, hopefully, a higher standard of living for the population.

Intra-industry trade will stimulate innovations and allow firms to exploit economies of scale. These two positive effects are not enough; the intra-industry trade need not cause the dislocation that the inter-industry trade is associated with. The intra-industry trade allows a country to specialise in a limited variety of products and benefit from the increasing returns in economies of scale, but this does not mean that the variety of goods are reduced since countries trade with each other and get the same products but just slightly differentiated in some way since countries do differ in production technology and other things.

If the intra-industry trade between Sweden and Russia is showing signs to be a significant part of trade then that could indicate that the Russian economy is in fact catching up to the industrialised countries. Theory predicts that countries that are similar to each other will trade, and this is mostly visible in the intra-industry sector.

As the development over time in the intra-industry trade is small in the selected commodity groups, as can be seen in table 4-2, there was no reason to make a weighted average so as to avoid taking great fluctuations in trade into account.

Looking at Table 4-3 one can conclude that over all the intra-industry trade has increased between Sweden and Russia in four out of five commodity groups, which is a positive result for the arising economy of Russia. The improvement in intra-industry trade between Sweden and Russia should be a sign of a better trade policy and it is also confirming the Linder hypothesis, when countries get more alike, they tend to turn towards a two-way trade since they then have the same demand structures. According to Bureanstam Linder (1961) countries only trade with other countries of the same preferences. They also tend to trade with countries of similar income levels. The most common way of testing the similarity of demand structures of two countries is to compare the average income of each country. In the case of Sweden and Russia it is clear to see in Table 4-1 that the average incomes of the two countries differ around $20,000. This is clearly not a case of similar demand structures and must have some impact on the trading pattern. But still, there can be groups in both countries that have an overlapping demand structure.

We are experiencing a higher intra-industry trade within the optical instrument group since it was empirical proven before to be higher for sophisticated manufactures, such as chemicals and electronics. The decrease in intra-industry trade with Russia in the vehicles sector can be an effect of the trade restrictions that Russia put up for foreign vehicles, making the trade with other countries more expensive and complicated. But with the increasing disposable income of the population one can expect a change towards foreign made vehicles, and hence increasing the intra-industry trade. One could also assume that there is to be a substantial illegal import of cars that is not registered and therefore could not be included in the empirical result.

The food sector, in this thesis grain, has increased a lot over the investigated years. Starting out with only a one-way trade (Sweden only exported) and then in 2003 having a two-way trade. This can be a sign of increased quality of the Russian grain.

There is also a change in what kind of commodities Sweden and Russia is trading, the visual pattern from Table 4-3 is that the trade has now increased with more sophisticated goods (optical instruments) and luxury goods (jewellery) which is a sign of an income substitution effect. It is also a sign of Russia becoming more and more alike the already devel-
oped countries. The average income has increased and people start to consume more refined goods. This can also be as sign of import substitution.

The increase in optical instruments and jewellery could also be because of the larger opportunity to differentiate the products, compared to forest and grain. Theory suggests that products that are easier to differentiate are more frequently spotted among the products that show a high degree of intra-industry trade.

An explanation to why the intra-industry trade shows low numbers between Sweden and Russia, over all, could be the fact that Russia is not a member of the European Union, and is therefore suffering from tariffs and other trade restrictions which would imply that it is not a trade that is free flowing. Free trade agreements are according to Culem and Lundberg (1986) about to stimulate the intra-industry trade all over the world.

The distance between two nations also has a significant impact on the volume traded: the further away two countries are the more costly trade will be. Not only monetary costs, but also as differences in culture and language add to the impediments to trade. Clearly, Sweden experiences more intra-industry trade with countries that are closer and share the same language, but how much fun would that be to investigate in?

All the numbers in Table 4-1 are also supporting the conclusions made from the empirical result. The decrease in the Russian population between 1997 and 2003 could be a sign of the increased wealth among the population and the need for a lot of children, for future sustainability, is no longer necessary. There has also been an increase in the GDP of Russia, but more important is the increase in the gross national income (GNI). Using the GNI as a proxy for the increase in welfare for the population in Russia (and Sweden for that matter) always raises the discussion on how suitable it is to determine that. If the per capita income differences between two trading partners are large it implies that the quantity of intra-industry trade is low. If the difference is seen as a supply side phenomenon as in the Helpman and Krugman (1985) model, where the differences are seen as variations in the capital-labour endowments. If instead the dissimilarities are indicators of the demand side it will be a sign of the demand structures being unequal, and that leads to a decrease in the intra-industry trade since the same things are not demanded by the two populations (Burenstam Linder, 1961). Regardless of which, a higher income is assumed to increase intra-industry trade for the reason that the country is moving towards the same standard as the more developed countries. And as soon as the demand structures are more similar to each other, the intra-industry trade will increase.

The most striking differences between Sweden and Russia in Table 4-1 are the population and size of the countries. Clearly, Russia still has a lot to gain in technology development and in the development of consumer goods and services. Unreliable data because of insufficient custom controls
5 Conclusions and suggestions for further research

The history of Russia has made its impact on the country’s economic development and restricted the economy from evolving at the same rate as the other western countries. The purpose of this thesis was to see whether one could determine, from the result of the intra-industry trade, if the Russian economy had changed and started its journey towards the more industrialised countries in the west.

The intra-industry trade theory contradicts the classic trade theories, such as the Ricardian and Heckscher-Ohlin model since it suggests that countries will trade more the more alike they become. Also, the Linder hypothesis is claiming that countries will trade with other countries that have similar demand structures since the degree of intra-industry trade between countries is generally decided by the average income level of the country.

Both economies of scale and the differentiation of products are important for the trade to take on the intra-industry trade pattern.

There is a hypothesis stating that the sectoral composition of market economies changes in a predicted way as the economy grows larger and richer. This hypothesis predicts three different stages of changes. The first sign of change is a declining agricultural sector; secondly a rise in the industry share and then stagnation until employment in the heavy industry starts to decline; last the share of services increases.

There is no doubt that the intra-industry trade has become a large and important feature of the world economy and trade these days. This also holds for Sweden where the intra-industry trade is about half of the total trade, and especially strong within manufactures (which applies to all intra-industry trade and not only on the Swedish one).

What one can conclude from the results seen in table 4-3 is that the intra-industry trade between Sweden and Russia has increased in four out of five commodity groups. And just as the theory of income substitution predicts, a change from more normal goods such as foodstuff towards a consumption of more luxurious items, which could be an indicator of the Russian people having more disposable income to spend on a daily basis.

The results from the empirical observation supports the theory used in this thesis. The Linder hypothesis is explaining the way to a more intense intra-industry trade between the two countries as the Russians get richer along the way.

On how to further improve the intra-industry trade between Sweden and Russia would be to make it harder to illegally import cars to Russia. This would probably make the statistical numbers more correct and also create a stronger link between the two countries. If Russia ever joins the EU that would also improve the trade links since a lot of the trade restrictions would disappear and that would encourage more trade.

My suggestions for further research would be to see the gains on intra-industry trade if Russia joins the European Union. Also, the same study but with a longer time span than this study. And most interesting of all, see the change from the early 90s until today.
References


