THE EFFECT OF EXPORT DIVERSIFICATION ON COUNTRY GROWTH

by

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ABSTRACT

Export diversification is considered a tool for developing countries to have sustainable earnings from exports which leads to income growth. The purpose of this thesis is to test the existence of the effect of export diversification on countries' economic growth using the system GMM estimator of dynamic panel model across countries. For the research I use a sample of 88 countries in the period 1962-2009, calculating the Herfindahl index of export concentration from two different datasets to get the data for the whole period and adding it into the equation of augmented Solow growth model estimation. The main finding of the paper provides evidence on the positive impact of export diversification on countries' income per capita growth, with the stronger effect on developing countries.

Keywords: export diversification, growth, dynamic panel model, system GMM

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TABLE OF CONTENTS

1. INTRODUCTION

Expanding exports is one of the main factors enforcing economic growth of countries, but in the world of unstable demands of customers and risky investments it is very hard for developing countries to have sustainable export earnings. Export diversification is considered a remedy for these risks and an important tool to get stable earnings from exports. In this thesis I aim to investigate the relation of export diversification on countries' economic growth.

Export diversification along with export development (expansion) has become an important issue for development economics literature since 1950s and today it is being widely researched by development economists. Export diversification is playing an important role for the developing countries' development policies. Influenced by Presbish (1950) and Singer (1950) many developing countries in Latin America, Africa and South Asia had employed as their main development strategies those, favoring import substitution based on restrictive trade policies for economic diversification during 1950-1970s. From the 1980s the success of China, India and the East Asian "Tigers" made this viewpoint of economic diversification through import substitution to change towards export expansion and outward orientation.

Production and therefore exports of developing countries, the least developed countries in larger extent, are concentrated on a narrow range of goods in sectors of unprocessed natural resources that are usually low value-added products. Countries with undiversified export structure face a common problem of dependence on exports of primary commodities which leads to high vulnerability to different types of outer risks. These countries experience slowdown of growth rates and terms of trade deterioration when negative commodity shocks hit world prices. More concentrated economies are affected more severely by macroeconomic risks as global demand instability and price volatility. Countries with high concentration of exports tend to have

less private investments in the economy. Diversification of export structure is one way to reduce the constraints associated with export specialization for developing countries to achieve allocative efficiency and sustainable export earnings. And since in many developing countries domestic demand is usually low, exports are considered one of the few remedies that in the long run can significantly contribute to countries' income per capita growth rates. However, Klinger and Lederman (2006) and Cabellero and Cowan's (2006) findings show that countries' export structure follows the same pattern of development of their domestic production. This pattern is: as countries get more and more developed their domestic production changes to a more concentrated structure after some point. This finding raises the question whether developed economies' change from diversified exports to more concentrated one is beneficial for their further economic growth or not.

The purpose of this thesis is to check empirically how export diversification, based on the Herfindahl index of export concentration, affects countries' economic growth. For this I use a sample of 88 developed and developing countries in the period between 1962 and 2009, constructing a panel dataset of ten period observations averaged through five years to eliminate business cycle fluctuations affecting economic growth. I estimate a growth model based on augmented Solow model using system GMM estimator since it gives more consistent estimates for dynamic growth models. The main conclusion of the work is that countries, and especially developing economies, do benefit from export diversification. To test for the nonlinearity in the relationship between country economic growth and export concentration I include the squared term of the Herfindahl index of export concentration into the regression. Another test was done to find any difference in magnitude of the effect of export diversification on growth for only developing countries by excluding all high-income countries from the sample.

The rest of the paper is organized as follows: in section (2) I review historical evolution of the research topic and the previous works done in the field. Section (3) describes theoretical background of the research. In section (4) I describe the data used for the empirical estimation and the sources of the data. In the following section I describe the Herfindahl index as a measure of export concentration and how I calculated the index from two different sources. Section (6) provides the empirical methodology and econometric specification of the model the results of which are described in section (7). And finally, my conclusions from the empirical results are given in section (8) followed by Appendixes.

2. LITERATURE REVIEW

The history of the economic interest in undiversified exports, export concentration goes back to 1950s. However the interest in the effective structure of trade was common much earlier. In this chapter I review the historical development of the main idea of the paper, first as it emerged theoretically starting from traditional trade theory and its justification by the modern portfolio theory, and then the related empirical research done to justify the theory.

The theoretical base of diversified export's inducing per capita income growth is not new. The idea rose from the view that expanding exports is beneficial for country's economic growth. Mercantilists at their time strongly suggested the necessity of expanding and promoting exports and increasing trade surpluses by minimizing imports to accumulate precious metals, wealth and national mercantile power. Beginning from classical theories introduced by Ricardo (1817) and Smith (1776), the common theory was that each country has a "comparative advantage" in producing some goods, in exporting some particular products, and that specializing exports on those products will create "gains from trade".

During the industrial revolution times when production and exports expanded most classical theorists following Mill (1848) debated on the sources of comparative advantage. Herchscher and Ohlin introduced the most debated comparative advantage theory in 1930s. The theory focused on explaining trade, exports and their evolution by relative factor or resource abundance. This theory was useful for explaining some developing countries' trade over the years, but not all trade, therefore other comparative advantage theories developed in order to explain trade by other means such as economies of scale, increasing returns and others.

Michaely (1958) studied concentration of exports and imports measured by GINI coefficient of concentration based on 150 Standard International Trade Classification (SITC)

commodities across 44 countries. He observes that countries with less concentrated, i.e. more diversified export structure are more developed in the sense that they have higher income per capita and are more industrialized.

To explain the technology intensive trade better than comparative advantage based traditional trade theory, which failed to do so, economists established new theories that took into account different considerations as externalities, increasing returns, economies of scale, product cycles, demand and tastes. Dornbusch, Fischer and Samuelson (1977) based on Ricardian model with a continuum of goods indicate that countries' trade increases with the increase of the products range they export. They define the competitive margin in production between exported and imported products, and show that transport costs and tariffs set a commodities range that are not traded. Acemoglu and Zilibotti (1997) in their model supported by empirical observations show that the presence of indivisible projects at the early stages of development limits the degree of diversification and that development goes jointly with export diversification and markets expansion. They emphasize that better opportunities of diversification help to gradually allocate resources to be used most productively and decrease the volatility of growth. Koren and Tenteiro (2004) explore output volatility and development relationship. They find that if a country specializes in highly volatile sectors, has high sectoral concentration and/or specializes in sectors on which country-specific fluctuations have strong impact, its productive structure tends to be volatile. Another finding was that as countries develop, their productive structure evolves from more volatile to less volatile sectors and country specific fluctuations decrease.

Other trade theories also explaining exports are: Samuelson's specific factors model based on multiple factors and mobile labor; demand and tastes based Linder's theorem; product cycles model taking into account phase of innovation, production and exports introduced by

Vernon; economies of scale and role of externalities trade models; extensive and intensive margins in exports.

The modern theory of portfolio management introduced by Markowitz increased the importance of the concept of diversification. Diversification, based on a wise common saying "Don't put all your eggs in the same basket" and encouraged by modern portfolio selection theory, has come to be considered as a means to decrease dependence of a country on a particular product or a narrow range of primary goods that are usually exported before processing to final goods. For many developing countries, heavily relying on the trade of handful commodities and having low economic growth rates, it would be beneficial for income and employment in the country to diversify the economies by selecting such export portfolios that will optimize the anticipated returns with market risks. Love (1979) claims that the benefits of diversification could be quantified using the portfolio theory. Strobl (2002) finds, based on the modern portfolio theory approach, that moving exports towards their "optimal" structure which is on the mean-variance efficient frontier is considerably beneficial.

Structural models of economic development suggest that countries should diversify from primary goods exports towards manufactured goods exports to attain sustainable growth (Chenery (1979); Syrquin (1989)). According to Prebisch-Singer thesis vertical export diversification could decrease declining terms of trade for countries that have dependence on commodities.

Recently export diversification is being linked by economic literature to the "self-discovery" or innovation process that means new export products discovery by firms, farms or Governments. This literature emphasizes the role of externalities associated to the new export products discovery process (Hausmann and Rodrik (2002); Klinger and Lederman (2005)) or

those related with the unsuccessful failures in taking crucial steps to induce sector-wide productivity (Rodriguez-Clare (2005)).

Belief in the relation of export diversification, export growth and countries' overall economic growth is researched by many empirical studies. The ESCAP (2004) focusing on Myanmar, Malaysia, Nepal and Bangladesh, using 1973-2001 long term data and Granger standard causality test establish that: firstly, in Malaysia both horizontal and vertical export diversification variables have statistically significant effect on total export, in Nepal and Bangladesh only vertical diversification has positive statistically significant effect, while in Myanmar neither of the diversification variables have statistically significant influence on total export growth; and secondly, in all four countries' export growth had causality effect on its real GDP per capita.

From the earlier theoretical literature that started development of models based on industrialization and meant the relation between export diversification and growth or country development (Presbish (1950), Singer (1950)) it can be concluded that since export instability is associated with substantial costs related to unstable demand and risky investments, it is necessary to shift from the dependence on a narrow range of export products towards a diversified export structure for sustainable growth. Also that literature suggested that encouraged by protection infant industries could contribute to diversification. Vernon (1966), Krugman (1979), Grossman and Helpman (1991), Pineres and Ferrantino's (1997) models also highlight the link between export diversification and growth.

Empirical literature in economics also finds evidence for the connection between export diversification, aggregate export growth and overall country economic growth. Empirical research was done by estimating cross-section of countries, time series on a particular country

and panel estimation of countries for different periods. Al-Marhubi (1998) using cross country analysis over 91 countries for the period of 1961-1988 using exported products at the three-digit SITC level and calculating "the absolute deviation of the country commodity shares from the world structure" and Hirschman index of concentration for SITC commodities finds empirical evidence that export diversification is indeed associated with higher economic growth rates. Agosin's (2007) finding in a cross-sectional regression was that export diversification has stronger impact on the growth of income per capita if a country's aggregate exports grow as well. Lederman and Maloney (2007) conclude from dynamic panel model estimation that export concentration is negatively correlated with growth.

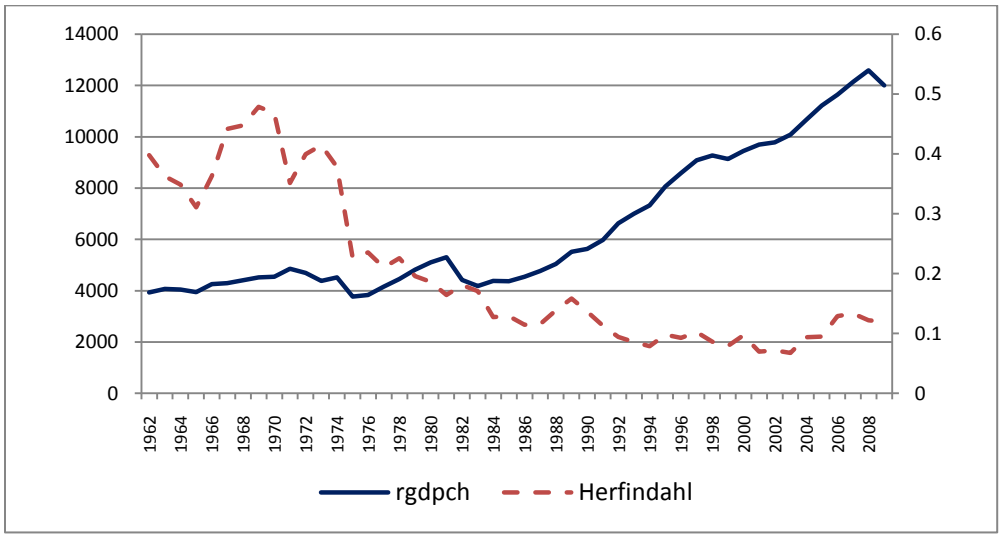

Figure 1: Evolution of Real GDP per Capita and Export concentration in Chile

Chile is an example of a country which turned to the diversification of its export structure. Starting from the 70s the concentration of Chilean exports started to decline with an enormous speed and from about 0.4 in the early 70s went down to around 0.2 in the beginning of 80s. The decline in export concentration smoothly continued later on as well. Export diversification and economic growth in Chile studied by Amin Gutierrez De Pineres and

Ferrantino (1997) and later by Herzer and Nowak-Lehmann D. (2006) suggest that the country benefited a lot from export diversification. The evolution of Chilean export concentration (Herfindahl index) and real GDP per capita (Chained series) is shown in Figure 1.

However there is also literature suggesting that countries benefit from concentration. Imbs and Wacziarg (2003) find a U-shaped pattern of relationship between income per capita and domestic sectoral concentration across countries. They interpret the U-shape in the relationship as diversification of production in the early stages of countries' development evolving into specialization as the income level in countries gets higher. Klinger and Lederman (2006) and Cabellero and Cowan (2006) show that countries' exports evolve in the same manner as the domestic production, but the turning point from diversification to concentration is on the higher level of GDP per capita which was around US$9,000 for domestic sectoral concentration. This means that only the most advanced economies benefit from more concentrated export structure.

Hesse (2008) together with the World Bank's Commission on Growth and Development using the system GMM estimator for a sample of 99 countries and Herfindahl index of export concentration studies the impact of export concentration on economic growth of countries based on augmented Solow model in the period of 1961-2000. Adding the squared term of the index he finds some evidence of nonlinearity in the relationship, but the coefficients on the squared index are not significant in the work. I use Hesse's approach of using the system GMM estimator for growth as it is considered to give the most consistent estimates for dynamic panel models (Greene (2003)), and aim to find the relationship of export diversification on a different sample of countries and adding more recent data.

3. THEORETICAL BACKGROUND

In this section of the thesis I describe the theoretical background of the model I use to investigate the relationship between export diversification and countries' income per capita or economic growth.

It is important for countries to figure out the foreign demand and minimize the costs of exporting (Vettas, 2000). Sometimes it is hard to predict the foreign demand for goods that domestic producers want to export, whether it is an existing product or a new one. Foreign consumers show interest in the products and their features only when they see them, i.e. when producers already start exporting. Other domestic producers of the same products observe the success or the failure of the pioneers in exporting. In case of success they could imitate the pioneer's behavior or make steps for improvements possibly enforcing more foreign demand which is the externality effect of exporting that could contribute to higher growth. The example of the Chilean wines exports could be an example of the foreign demand exploration studied by Agosin (2007) and Agosin and Bravo-Ortega (2007). Chile had been producing wines from the seventeenth century, but till the mid 1980s there was no foreign demand for it and consequently no exporting of wine. When some domestic wine producers employed better production techniques Chilean wines became demanded by foreign consumers. So, finding the opportunities by exporting abroad made Chilean wines one of the main products of its exports.

Hausmann and Rodrik (2003), Hausmann, Hwang and Rodrik (2006) and Hausmann and Klinger (2006) analyze the effect of export diversification and aggregate exports on economic growth. In their setup, the diversification of countries' investments into new activities, not its comparative advantage, is the driving power of the growth. The costs that entrepreneurs face play an important role in the model. Production of new goods, according to the model, imposes

entrepreneurs to high cost uncertainties. If the project of developing a new product is successful the benefits of it will be socialized, there will be information spillovers caused by other entrepreneurs' imitating the production of the similar product. However, if the project fails, all the costs will be borne only by the entrepreneur. This risk results in a small amount of investments in new activities and innovations. Hausmann and Rodrik (2003) suggest that the solution in this case would be in government entrepreneurship policy. The government should play an important role in supporting industrial growth and structural changes. Promoting entrepreneurship and creating the conditions for right incentives to invest in a new range of activities from entrepreneurs that will result in diversified production and exports.

As mentioned in the previous section the export structure of the countries follows the same pattern of evolvement as the domestic production. Theoretically, Imbs and Wacziarg (2003) explain economic diversification of domestic production by two arguments. One of them is the preference-based argument which implies the demand for wider range of products for consumption as the income level in the country gets higher. The other one is the portfolio argument based on producer's investments in many risky sectors which lead to diversification of production. The specialization on higher stages of country development according to Dornbusch et al. (1977) is due to decreasing transportation costs over time which results in decrease in the number of products produced domestically leading to incentives to specialize. Another explanation of concentration is that producers are better off by clustering because of the demand externalities. This might lead to sectoral concentration.

Based on these theoretical models I will estimate an econometric model of the relationship between export diversification and countries' economic growth. Since the sample of countries I use for this research contains both developing countries and high income countries, I

expect to find the relationship between the variables to be as described by the theories. So I expect to find a nonlinear relationship of export diversification and country growth.

4. DATA DESCRIPTION

The data for the study is macro level data for 88 countries for the period of 1962-2009. The dataset is compiled into a panel data from sources as Penn World Table 7.0 (PWT), Feenstra et al. (2005), The World Bank's World Development Indicators and Educational Statistics (from Barro-Lee (2010) paper).

All the variables in the dataset except the average years of schooling variable are averaged over five year intervals (the first and the last are averaged over four years) to control for business cycle fluctuations. This averaging results in ten period observations for each country. Average years of schooling variable is given in the Educational Statistics dataset for each five years, therefore the variable values are taken as given in the original dataset.

The dependent variable in my growth model is the growth rate taken as the log-difference of the Chain volume series of the Real Gross Domestic Product (GDP) per capita growth in constant 2000 prices, adjusted for the purchasing power parity (PPP). The data for this variable is taken from the PWT 7.0 dataset and averaged over 5 year periods.

The Solow growth model suggests that income per capita growth depends on the period's natural logarithm (log) of the initial income (log of the real GDP) and savings rate. To proxy for the savings rate I use the five year averages of the investment share of the real GDP. As a proxy for the growth in labor force I use the growth rate of total population of countries by taking the natural logarithm of the total population of the country used in the sample of this work. To account for the differences in human capital, I include the natural logarithm of the average years of total schooling of countries' population aged 25 and older. The data for total population and schooling is reached from the PWT 7.0.

The main explanatory variable in my research is the export diversification or to be exact export concentration, that is the opposite of export diversification and therefore in the regressions is predicted to have negative impact on real GDP per capita growth. This variable is calculated by as the Herfindahl index of concentration. The export concentration for the period of 1962-2000 is calculated from the Feenstra et al. (2005) dataset that consists of world trade flows based on the second revision of four-digit SITC classification of products. This dataset is very complex in scope and has much less number of missing observations compared to Commodity Trade datasets.

As Feenstra et al. (2005) dataset does not cover the trade flows data after year 2000 I use the United Nations Commodity Trade Statistics Database (ComTrade). This dataset is similar to the previous one, but is given in six digits, which means that it is more detailed than Feenstra et al. (2005) dataset, it also contains world trade flows from which the export concentration for the last two periods (2000-2009) is calculated. Even though two datasets for calculating export concentration use different product classification, I believe they could be combined to get the same concentration index for each country and year since the classifications themselves are very similar (see in the Appendix). However, countries for which the calculated index's difference in year of 2000, for which Herfindahl index is calculated from both sources, is higher than 0.015 in absolute value are excluded from the sample. One point to note is that both datasets contain only the data on physical product exports without services.

To calculate the export concentration variable I used the Herfindahl index which is the sum of squared shares, shares of export values of products relative to the total exports. The calculation technique differed for two datasets due to the difference in the data source and

construction. The more broad description and calculation of the Herfindahl index is provided in the following section.

Countries for which there is no data for schooling, The Organization of the Petroleum Exporting Countries *(*OPEC*)* and The Organization of Arab Petroleum Exporting Countries (OAPEC) members are not included into the sample since most of them are high-income countries with high export concentration which makes them outliers for my research. Also the East European countries and former Soviet Union countries are not included into the sample since all the data for these countries are available only from 1990.

For the robustness check I will include into the regression such variables as openness, which is defined as the sum of exports and imports of the country relative to its real GDP, and government expenditures relative to real GDP, both taken from the PWT 7.0. The descriptive statistics of all the variables, the list of the countries used for the thesis are attached in Appendix.

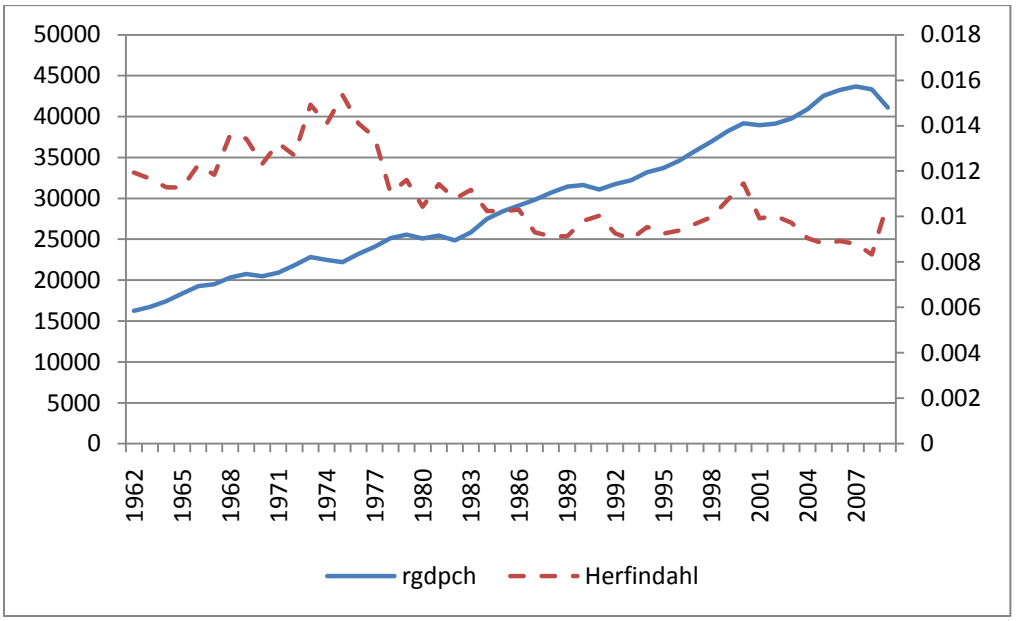

Figure 2: Evolution of Export concentration and Real GDP per Capita in USA

Figure 1 and Figure 2 show the evolution of the per capita Real GDP and calculated Herfindahl index for the United States and for the averages of all countries in the sample.

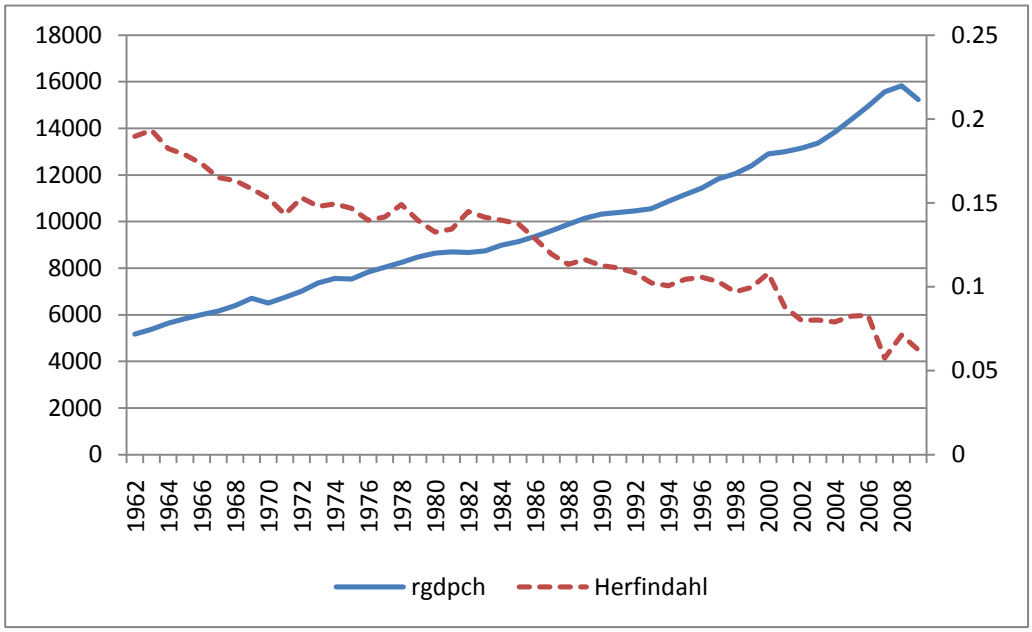

Figure 3: Evolution of Export concentration and Real GDP per Capita, sample averages

5. THE HERFINDAHL INDEX

Concentration of exports can be calculated by many different measures and indexes such as The Hirchman Index, The Ogive Index, The Entropy Index, The GINI coefficient, The Herfindahl Index and some others. I choose the Herfindahl Index as the measure of countries' export concentration since it is one of the most commonly used measures of export concentration in recent economic literature (Lederman and Maloney (2007), H. Hesse (2008)).

Originally, the Herfindahl Index is the measure of the size of the firms relative to the industry they belong to and indicates the amount of competition among the firms, so it is the measure of industrial concentration. The index summarizes the market control concentration by the biggest firm in the industry and how oligopolistic the industry is. In Wikipedia it is defined as the sum of the squares of the market shares, expressed as fractions, of the largest 50 firms of a given industry. So the value of the index ranges from zero to one. The higher is the Herfindahl index the lower is the competition in the industry, so that the big part of the market is controlled by small number of firms, and vice versa.

The Herfindahl Index is calculated by the following formula:

$$H = \sum_{i=1}^{N} (S_i)^2$$

Where S_i is the market share of the firm, N is the number of firms.

I use this formula to calculate the concentration of the exports of the country. So that, S_i in my research is the share of the exported product (or product group) value, according to its commodity code, in a given country relative to country's aggregate exports. If the Herfindahl index is close to zero in a given country it means that the export structure of the country is well diversified, i.e. its exports are not concentrated on a narrow range of products.

As I used two different sources and the data for exports in them is given differently, the calculation process of the Herfindahl index between them differed as well. Feenstra et al. (2005) data is given yearly from 1962 to 2000 covering all products trade flows for all countries. So for the period of 1962-2000 the calculation process was as follows: calculating the total value of exports for each country, calculating the value of each product according to its four-digit SITC code for each country, then finding the share of each product in country's exports, then calculating the sum of squared shares of exports for each country which results in the Herfindahl index of export concentration for a given year. Next step was to combine data for all years together and find the five year averages for each country.

The ComTrade database is based on the Harmonization Code System (HS-Code) product classification groups covering all countries and years for which the dataset contains observations. The calculation of the export concentration in this case was as follows: the products were classified by 6-digit code, so the first step was to derive the 4-digit code for all products; then calculating the value of exports for each product in the given product group for each country and each year; then combining all the commodity group data into one dataset and then calculating the totals of trade flows for each country and year; then finding the shares and after all calculating the Herfidahl index of export concentration itself. The next step was to find five year averages. This dataset is not as complex as Feenstra et al. (2005) dataset so there are many missing observations in terms of missing trade flows data for some countries' trade flows for some years.

6. EMPIRICAL METHODOLOGY AND MODEL SPECIFICATION

I estimate a dynamic panel model of growth using the Generalized Method of Moments (GMM) estimator since it is more suited to analyze growth models than other methods. The usual cross-sectional country growth regressions do not take into account the fact that most of the macroeconomic variables are determined endogenously. For example, the dependent income growth variable is correlated with the initial level of the income (Knight et al., 1993). Caselli et al. (1996) states the interdependence of most of the macroeconomic variables in cross-sectional regressions which leads to misspecification of those models. Omitted variable bias is another problem with using the cross-sectional country growth regressions since they cannot capture the factors like the initial level of technology which is time-invariant and specific for each country. Yet another pitfall of using the cross-sectional regressions for analyzing country growth is that by aggregating all the information from the sample much of the valuable information could be lost, so the dynamic relationship over time cannot be analyzed.

I use the same strategy as Caselli et al. (1996), Lederman and Maloney (2007) and Hesse (2008) by using system GMM estimator for dynamic panel. Using the GMM estimator takes care of the problems with conventional cross-sectional regressions. Taking the first differences of the equation to be regressed cancels the country-specific factors that do not change across time, for example the initial level of technology. This solves the problem of omitted variable bias across factors that do not change over time. The endogeneity problem within the explanatory variables is also solved by using the GMM estimator since the lagged values of the explanatory variables could be used as instruments. Also using the dynamic panel estimation permits for multiple observations for each country across time, so the information loss problem arising in cross-sectional regressions is eliminated.

I estimate the income growth regression based on simple augmented Solow model to analyze the impact of countries' export diversification on income per capita growth. Using this framework of growth gives a theory-based intuitive strategy for testing the relationship between export diversification and countries' income per capita growth. I rely on the predictability of the Solow model and employ small number of explanatory variables to avoid over controlling of the regression equation.

According to Solow model output per worker growth is a function of the initial output per worker, the initial level of technology, the technological progress rate, savings rate, rate of depreciation, the growth rate of labor force and others. The model predicts savings rate to have positive effect on output per worker, whereas the growth of workforce to have negative effect. As an additional determinant of the growth a measure of human capital accumulation is added into the augmented model.

General growth equation I estimate is of the form presented below:

$$\Delta y_{i,t} = \alpha y_{i,t-1} + \beta_h h_{i,t} + \beta x'_{i,t} + \gamma_t + \mu_i + \varepsilon_{i,t} \qquad (1)$$

Where: $\Delta y_{i,t}$ – the log difference of income per capita in period t (i.e. the growth rate of income per capita in period t) and it is defined as $\Delta y_{i,t} = y_{i,t} - y_{i,t-1}$,

$y_{i,t-1}$ – log of initial income,

$h_{i,t}$ – the Herfindahl index of export concentration,

$x'_{i,t}$ – vector of control variables potentially determining growth,

γ_t – accounts for sample wide time effects,

μ_i – captures the unobserved time-invariant effects specific for each country,

$\varepsilon_{i,t}$ – residual error term.

I assume that: $\mathrm{E}(\varepsilon_{i,t} | y_{i,0}, \ldots, y_{i,t-1}, x'_{i,1}, \ldots, x'_{i,t}, \gamma_1, \ldots, \gamma_t, \mu_i) = 0$ (2)

As in common growth models, I use GDP per capita as a proxy for income per capita, so the growth rate of income per capita is the log difference of real GDP per capita and the initial

level of income per capita is the natural logarithm of lagged GDP per capita. I take the natural logarithm of the average years of schooling of the total population aged twenty five years old and older as a proxy for the human capital accumulation. The human capital accumulation by the theoretical prediction should have a positive effect on country's economic growth. As for the labor force growth rate I use the natural logarithm of the total population that should impact the growth negatively. To identify the impact of the export diversification on countries' growth rate I add the Herfindahl index of export concentration to the regression equation. As export concentration and export diversification sum up to one, the prediction that export diversification has positive effect on economic growth implies that export concentration – the Herfindahl index – should affects growth negatively.

Klinger and Lederman (2006) estimating the Herfindahl index on the log of income per capita and its squared term find a nonlinear relationship which suggests that countries diversify their export structure up to some point in their development after which get more concentrated in their exports. To test whether the change brings higher growth rate, the squared term of the Herfindahl index is added into the regression. So in another estimation of the growth rate the squared term of the Herfindahl index will be added as an explanatory variable. The finding of a U-shaped relation of export concentration on economic growth would mean that for some countries export concentration is more beneficial than diversification.

I will use the system GMM estimator, developed by Arellano and Bover (1995) and Blundell and Bond (1998), rather than the first-difference GMM estimator, developed by Arellano and Bond (1991), as it is more suited for growth regressions according to Bond et al. (2001) and Hoeffler (2002). The system GMM estimator uses first-differenced equations with

suitable lagged levels as instruments as the first-differenced GMM. In addition to that it uses equations in levels with lagged first differences of the dependent variables as instruments.

As suggested by Anderson and Hsiao (1982), Arellano and Bond (1991), Caselli et. al (1996) I transform the equation (1) by first-differencing and as a result equation (1) now becomes:

$$\Delta\dot{y}_{i,t} = \alpha\Delta y_{i,t-1} + \beta_h\Delta h_{i,t} + \beta\Delta x'_{i,t} + \Delta\gamma_t + \Delta\varepsilon_{i,t} \qquad (3)$$

Where, now the transformed dependent variable is $\Delta\dot{y}_{i,t} = \Delta y_{i,t} - \Delta y_{i,t-1}$.

As the result of transformation, the unobserved country specific factors (μ_i) that do not change over time drop out from the equation. But now the differenced error term follows a moving average, MA(1), that makes it correlated with the differenced dependent variable. The problem could be solved by using as instruments the lagged levels of the variables (Arellano and Bond (1991)) to proxy for the differences in the context of differenced GMM. However, little variation of the explanatory variables used in the growth regressions, for example years of schooling, usually makes the lagged levels to be only poor instruments according to Levine, Loayza, and Beck (2000), Lederman and Maloney (2007). Therefore they use Blundell and Bond (1998) and Arellano and Bover (1995) approach by using system GMM estimator, which in addition to the lagged levels of the original equation uses the lagged differences of the endogenous variables as instruments. I follow this approach as well since Bond et. al (2001) show that in cross-country growth equations the problem of "week instruments" can be a very big issue.

Equation (2) is a crucial assumption of the sequential moments restriction which means lack of serial correlation so that the expected value of the error term given its all past values is equal to zero. This restriction is crucial for the parameters of interest identification. I use the time

fixed effects to control for the variation in the variable due to the period specific factors. So, the equation (3) takes the form which depends only on the variation of the explanatory variables of interest.

Since as a dependent variable I use log difference of GDP per capita I loose one period observation in equation (1) and for getting the first-difference transformation as in equation (3) one more period observation is lost as well. However since the number of countries is large enough and according to Arellano and Bover (1995) system GMM is consistent for large cross-section and small period observations this is not a problem. Using a nonsingular 9×9 transformation matrix which is not singular, 9 equations could be transformed into:

$$\boldsymbol{N} = \begin{bmatrix} \boldsymbol{K} \\ 9^{-1}\boldsymbol{a}' \end{bmatrix}$$

where K is 8×9 first-difference transformation matrix of rank 8 which satisfies $\boldsymbol{Ka} = 0$ ($\boldsymbol{a}$ is a T×1 matrix of ones).

In addition to (2) a crucial assumption is:

$$\mathrm{E}(\mu_i \,|\, y_{i,1},\ \ldots,\ y_{i,T-1},\ h_{i,1},\ \ldots,\ h_{i,T-1},\ x'_{i,1}\ \ldots,\ x'_{i,T}) = 0 \qquad (5)$$

As Arellano and Bond (1995) I define (2T-1)×T transformation H = (K', I_T)' and

$$Z_i = \begin{bmatrix} Z_{di} & 0 \\ 0 & Z_{li} \end{bmatrix}$$

where Z_{di} is a block-diagonal matrix with the t-th block given by ($x'_{i,1},\ \ldots,\ x'_{i,t},\ y_{i,0},\ \ldots,\ y_{i,t-1}$) which provides all the available instruments for the t-th equation transformed by $\boldsymbol{K}$. Z_{li} is another block-diagonal matrix that contains instruments for equations in levels.

An optimal GMM estimator could be constructed based on the moment equations:

$$\mathrm{E}(Zi^{'}Nu_i) = \mathrm{E}\begin{bmatrix} Z^{'}_{di}Ku_i \\ Z'_{li}u_i \end{bmatrix} = 0$$

where $u_i = (u_{i,1}, \ldots, u_{i,T})'$.

Investments, population growth and export diversification in my model are endogenous to GDP per capita growth so that their values are correlated with past and present shocks to GDP per capita growth, but have no relation to the future shocks to GDP. The initial capital and schooling variables are considered predetermined for the growth of GDP. This implies that schooling and initial capital are affected only by the previous period shocks to GDP. This definitions help to choose the instruments for system GMM. I use the lagged level of the log of the initial income per capita, lagged difference of log growth rate of the GDP (lagged log difference) and lagged difference of the log of years of schooling as instruments of the predetermined variables. In addition to that I use current and lagged difference of all the endogenous variables as instruments. To test for the validity of all instruments I use Sargan-test of over-identifying restrictions which tests the null hypothesis that all the instruments together are valid instruments for the regression.

Since for export concentration I used two different data sources and constructed the index by my own calculations, for each model specification I run two different regressions. First, covering the first eight periods of my panel data, based on the data till 2000 for which the Herfindahl index is calculated from the data by Feenstra et. al (2005) provided by the National Bureau of Economic Research (NBER). And the other one covers the data till 2009 along with the combined data of Herfindahl indexes, which from 2000 was calculated based on the UN Commodity Trade database.

7. EMPIRICAL RESULTS

In this section I provide the results of estimations of the model of countries' economic growth based on the augmented Solow model using system GMM estimator. Here I explore the effect of export concentration (or export diversification which could be defined as (1 – export diversification)) on countries' economic growth.

The results of all estimations are presented in 14 columns of Table 1 and Table 2 below. Table 1 contains the regression results for the whole sample of 88 countries used for the research. As I mentioned above all the estimations are made 2 times for each specification of the model, first one covering the period of 1962-2000, and the second combining data on export concentration index and including nine more years of observations which result in additional two period observations for my study. All the odd-numbered columns in both tables cover the first 8 periods averaged over five years for the period 1962-2000. The even numbered columns contain data for the period 1962 till 2009.

The columns (1) and (2) are the estimation of the augmented Solow model, from which we can see the evidence of the theoretical predictions of the model. The initial income of countries' is negatively affecting country growth as predicted by convergence theory, positive impact of the investments in physical capital and human capital, the negative impact of the labor-force growth are also the predictions of the Solow growth model. The estimation results of this specifications of the model slightly differ from each other even though there is no variable for which in my sample the data is combined from different sources, the data on each variable is taken from the same data source. The signs of coefficients are the same, but the significance of the estimates and their quantitative values are different. The coefficient on investments variable is not significant at any conventional significance level. The Schooling variable becomes more

significant and almost twice the value of the coefficient estimated using eight periods. The population variable becomes even more significant when all ten year periods are used for estimation. The difference in the coefficients on variables is probably due to the additional information that comes with more observations.

Table 1: The system GMM estimation results of Augmented Solow Growth Model

	(1)	(2)	(3)	(4)	(5)	(6)
Initial GDP	-0.647 (0.000)***	-0.605 (0.000)***	-0.670 (0.000)***	-0.568 (0.000)***	-0.461 (0.000)***	-0.454 (0.000)***
Investment	0.006 (0.016)**	0.001 (0.547)	0.009 (0.000)***	0.011 (0.000)***	0.017 (0.000)***	0.016 (0.000)***
Schooling	0.273 (0.115)	0.433 (0.002)***	0.291 (0.090)*	0.035 (0.739)	-0.102 (0.256)	-0.062 (0.327)
Population	-0.743 (0.001)***	-0.7642 (0.000)***	-0.733 (0.001)***	-0.384 (0.001)***	-0.241 (0.073)*	-0.278 (0.002)***
Herfindahl			-0.229 (0.081)*	-0.238 (0.004)***	-1.438 (0.016)**	-1.245 (0.057)*
Herfindahl^2					1.398 (0.214)	0.966 (0.384)
periods	8	10	8	10	8	10
countries	88	88	88	88	88	88
observations	432	595	423	587	423	587
Sargan-test	0.993	0.705	0.913	0.534	0.801	0.781

Note: the dependent variable is the log difference of the real GDP per capita (i.e. the growth rate of the GDP per capita)
In parenthesis: robust p-values significant at 10% (*), 5% (**) and 1% (***)

In columns (3) and (4) I add the main variable of interest for this work - the Herfindahl index of export concentration. The effect of export concentration on income per capita growth is negative, as it was expected. The coefficient on export concentration is statistically significant and similar in magnitude. The absence of any dramatic change in the coefficients on export

concentration is the reason to believe that calculated from different datasets Herfindahl indexes can be combined together to get more observations. Similar to the schooling variable in columns (1) and (2) the effect of the export concentration is stronger, i.e. statistically more significant in the ten-period sample estimation but the difference in the coefficient itself is not as large as on the schooling variable. The results of this model specification suggest that countries with lower concentration of exports tend to grow faster. So, export diversification from this result could be considered as a factor that could enforce the economic growth of countries. The effect of the investments on growth is positive and statistically significant in both cases. The schooling's effect on growth in this specification behaves conversely to the previous specification of the model. It becomes insignificant and much smaller when regressed over all ten periods compared to eight-period estimation. The coefficient on population variable also gets smaller in column (4) but remains statistically significant as in column (3).

Columns (5) and (6) are the results of testing for the nonlinearity effect of export concentration on income per capita growth rate. The effect indeed has a nonlinear effect, but, similar to Hesse's (2008) result, export concentration itself has qualitatively higher negative effect than the positive effect of the squared term of itself. In both regressions the positive effect of the squared Herfindahl index is not statistically significant whereas the negative impact of the index itself is statistically significant. So, there is no enough evidence to conclude that the effect of the export concentration on income per capita growth follows a U-shaped pattern.

As for other variables in the third specification of the model, investments remain statistically significant and have positive effect on growth. Similar to that population growth has consistently negative impact on growth but the coefficient on the variable is much smaller

compared to the first and second specifications of the model. Schooling variable in this specification changes sign, but the coefficients are not statistically significant.

Table 2: The system GMM estimation results of Augmented Solow Growth Model

	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Initial GDP	-0.578 (0.000)***	-0.467 (0.000)***	-0.514 (0.000)***	-0.484 (0.000)***	-0.600 (0.000)***	-0.604 (0.000)***	-0.505 (0.000)***	-0.518 (0.000)***
Investment	0.015 (0.002)***	0.012 (0.000)***	0.010 (0.000)***	0.009 (0.000)***	0.007 (0.005)***	0.009 (0.000)***	0.012 (0.000)***	0.011 (0.000)***
Schooling	0.418 (0.092)*	0.058 (0.604)	0.106 (0.587)	0.091 (0.600)	0.173 (0.374)	0.084 (0.534)	0.061 (0.713)	0.029 (0.837)
Population	-0.963 (0.002)***	-0.517 (0.001)***	-0.532 (0.050)**	-0.495 (0.002)***	-0.509 (0.026)**	-0.363 (0.012)**	-0.443 (0.024)**	-0.352 (0.008)*
Herfindahl			-0.757 (0.010)***	-1.162 (0.000)***	-0.751 (0.011)**	-0.905 (0.000)***	-0.554 (0.032)**	-0.779 (0.000)***
Openness					0.005 (0.039)**	0.003 (0.016)**		
Government consumption							-0.554 (0.032)**	0.003 (0.773)
periods	8	10	8	10	8	10	8	10
countries	60	60	60	60	88	88	88	88
observations	290	410	289	410	423	587	423	587
Sargan-test	0.784	0.487	0.853	0.713	0.801	0.301	0.754	0.351

Note: the dependent variable is the log difference of the real GDP per capita (i.e. the growth rate of the GDP per capita)
In parenthesis: robust p-values significant at 10% (*), 5% (**) and 1% (***)

Columns (7), (8), (9) and (10) in Table 2 are the same model specifications as first four columns in Table 2, but this sample excludes all the high income countries reported by the World Bank's World Development Indicators dataset. From the columns (9) and (10) where the export concentration index is added into the equation it could be seen that the coefficient on the Herfindahl index is much larger in absolute value than those in columns (3) and (4). This finding

suggests that export diversification is more beneficial for developing countries since the results are not distorted by the developed high-income countries.

The last four columns are the robustness check regressions. The results of this four columns show that export concentration has a very robust negative effect on export diversification. Columns (11) and (12) also provide evidence for the predictions of countries openness for trade being beneficial for its growth.

8. CONCLUSIONS

In this thesis I investigated the question on how export diversification affects countries' economic growth. The results of my empirical work provide evidence for the positive impact of export diversification on economic growth of countries. Countries with highly diversified export structure are usually high-income developed countries. For developing countries it is essential to have sustainable export earnings to grow. However if exports of a developing country are concentrated on a small number of products, the country bears a risk of low demand or change in tastes of foreign customers as well as the risk of world prices shocks for which countries with concentrated exports are more vulnerable. Therefore export diversification is considered a tool to minimize the negative effect of those risks.

To find the causality effect of the export diversification I calculate the Herfindahl index of export concentration and include it into the regression equation of income growth model based on augmented Solow model. The finding supports the prediction of export diversification being beneficial for income per capita growth of countries. So for developing countries export diversification is a big opportunity to have sustainable export earnings and growth rate, since exports are important components of countries' GDPs.

I attempted to find a nonlinear causality effect of export concentration on country growth by including the squared term of Herfindahl index of export concentration into the regression. The result of this specification of growth model suggests that there is some evidence of nonlinearity, however, it is important to note that the positive coefficient on the squared term of export concentration is not statistically significant which makes it insufficient to conclude that the effect of export diversification is nonlinear.

I also estimated the impact of export concentration on income per capita growth based on the sample which excludes all high income countries from my original sample. The result of the estimation shows that the causality effect is positive and has quantitatively larger coefficients compared to the coefficients of all countries' estimation. This suggests that diversification is more beneficial for developing countries.

So overall, from the research done I conclude that all countries benefit from export concentration, and the positive effect is stronger for less diversified economies. This result could be useful for policy makers of developing countries. Governments of the developing economies should support the entrepreneurship and create conditions to motivate investments in new kind of activities and products. That would in the longer run result in the diversification of domestic production and exports, which causes higher economic growth.

APPENDIX A

List of countries

Albania
Argentina
Australia
Austria
Bangladesh
Belgium
Bolivia
Brazil
Bulgaria
Cambodia
Cameroon
Canada
Central African Republic
Chile
China Version 1
Colombia
Congo, Dem. Rep.
Congo, Republic of
Costa Rica
Cuba
Cyprus
Denmark
Dominican Republic
Fiji
Finland
France
Gabon
Gambia, The
Germany
Ghana
Greece
Guatemala
Guyana
Haiti
Honduras
Hong Kong
Hungary
Iceland
India
Indonesia
Ireland
Israel
Italy
Japan
Kenya
Korea, Republic of
Laos
Liberia
Luxembourg
Malawi
Malaysia
Mauritania
Mauritius
Mexico
Mongolia
Morocco
Netherlands
New Zealand
Nicaragua
Norway
Pakistan
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Poland
Portugal
Romania
Senegal
Singapore
South Africa
Spain
Sri Lanka
Sudan
Sweden
Switzerland
Tanzania
Thailand
Trinidad &Tobago
Tunisia
Turkey
United Kingdom
United States
Uruguay
Vietnam
Zambia
Zimbabwe

APPENDIX B

Descriptive statistics

Variables	Mean	Maximum	Minimum	Observations
Real GDP per capita (Chained Series)	9910.763	84778.29	152.014	849
Investments/GDP	23.120	86.815	1.717	849
Years of schooling	6.1215	13.218	0.2706	849
Population growth	1.568	8.424	-12.249	849
Export concentration (Herfindahl)	0.126	0.8404	0.006	849
Openness/GDP	65.403	432.671	2.394	849
Government consumption/GDP	9.880	39.557	1.305	849

APPENDIX C

1. Standard International Trade Classification (SITC)

- 0 - Food and live animals
  - 00 - Live animals other than animals of division 03
    - 001 - Live animals other than animals of division 03
      - 001.1 - Bovine animals, live
      - 001.2 - Sheep and goats, live
      - 001.3 - Swine, live
      - 001.4 - Poultry, live (i.e., fowls of the species Gallus domesticus, ducks, geese, turkeys and guinea-fowls)
      - 001.5 - Horses, asses, mules and hinnies, live
      - 001.9 - Live animals, n.e.s.
  - 01 - Meat and meat preparations
  - 02 - Dairy products and birds' eggs
  - 03 - Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof
  - 04 - Cereals and cereal preparations
  - 05 - Vegetables and fruit
  - 06 - Sugars, sugar preparations and honey
  - 07 - Coffee, tea, cocoa, spices, and manufactures thereof
  - 08 - Feeding stuff for animals (not including unmilled cereals)
  - 09 - Miscellaneous edible products and preparations
- 1 - Beverages and tobacco
  - 11 - Beverages
  - 12 - Tobacco and tobacco manufactures
- 2 - Crude materials, inedible, except fuels
  - 21 - Hides, skins and furskins, raw
  - 22 - Oil-seeds and oleaginous fruits
  - 23 - Crude rubber (including synthetic and reclaimed)
  - 24 - Cork and wood
  - 25 - Pulp and waste paper
  - 26 - Textile fibres (other than wool tops and other combed wool) and their wastes (not manufactured into yarn or fabric)
  - 27 - Crude fertilizers, other than those of division 56, and crude minerals (excluding coal, petroleum and precious stones)
  - 28 - Metalliferous ores and metal scrap
  - 29 - Crude animal and vegetable materials, n.e.s.
- 3 - Mineral fuels, lubricants and related materials
  - 32 - Coal, coke and briquettes
  - 33 - Petroleum, petroleum products and related materials

    - 34 - Gas, natural and manufactured
    - 35 - Electric current
- 4 - Animal and vegetable oils, fats and waxes
    - 41 - Animal oils and fats
    - 42 - Fixed vegetable fats and oils, crude, refined or fractionated
    - 43 - Animal or vegetable fats and oils, processed; waxes of animal or vegetable origin; inedible mixtures or preparations of animal or vegetable fats or oils, n.e.s.
- 5 - Chemicals and related products, n.e.s.
    - 51 - Organic chemicals
    - 52 - Inorganic chemicals
    - 53 - Dyeing, tanning and colouring materials
    - 54 - Medicinal and pharmaceutical products
    - 55 - Essential oils and resinoids and perfume materials; toilet, polishing and cleansing preparations
    - 56 - Fertilizers (other than those of group 272)
    - 57 - Plastics in primary forms
    - 58 - Plastics in non-primary forms
    - 59 - Chemical materials and products, n.e.s.
- 6 - Manufactured goods classified chiefly by material
    - 61 - Leather, leather manufactures, n.e.s., and dressed furskins
    - 62 - Rubber manufactures, n.e.s.
    - 63 - Cork and wood manufactures (excluding furniture)
    - 64 - Paper, paperboard and articles of paper pulp, of paper or of paperboard
    - 65 - Textile yarn, fabrics, made-up articles, n.e.s., and related products
    - 66 - Non-metallic mineral manufactures, n.e.s.
    - 67 - Iron and steel
    - 68 - Non-ferrous metals
    - 69 - Manufactures of metals, n.e.s.
- 7 - Machinery and transport equipment
    - 71 - Power-generating machinery and equipment
    - 72 - Machinery specialized for particular industries
    - 73 - Metalworking machinery
    - 74 - General industrial machinery and equipment, n.e.s., and machine parts, n.e.s.
    - 75 - Office machines and automatic data-processing machines
    - 76 - Telecommunications and sound-recording and reproducing apparatus and equipment
    - 77 - Electrical machinery, apparatus and appliances, n.e.s., and electrical parts thereof (including non-electrical counterparts, n.e.s., of electrical household-type equipment)
    - 78 - Road vehicles (including air-cushion vehicles)
    - 79 - Other transport equipment
- 8 - Miscellaneous manufactured articles

    - 81 - Prefabricated buildings; sanitary, plumbing, heating and lighting fixtures and fittings, n.e.s.
    - 82 - Furniture, and parts thereof; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings
    - 83 - Travel goods, handbags and similar containers
    - 84 - Articles of apparel and clothing accessories
    - 85 - Footwear
    - 87 - Professional, scientific and controlling instruments and apparatus, n.e.s.
    - 88 - Photographic apparatus, equipment and supplies and optical goods, n.e.s.; watches and clocks
    - 89 - Miscellaneous manufactured articles, n.e.s.
- 9 - Commodities and transactions not classified elsewhere in the SITC
    - 91 - Postal packages not classified according to kind
    - 93 - Special transactions and commodities not classified according to kind
    - 96 - Coin (other than gold coin), not being legal tender
    - 97 - Gold, non-monetary (excluding gold ores and concentrates)
- I - Gold, monetary
- II - Gold coin and current coin

Source: United Nations Statistics Division
http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=14&Lg=1&Top=1

2. Harmonization Code System (HS)

01 Live animals
- 0101 Live horses, asses, mules and hinnies.
  - 010111 Horses, live pure-bred breeding
  - 010119 Horses, live except pure-bred breeding
  - 010120 Asses, mules and hinnies, live
- 0102 Live bovine animals.
  - 010210 Bovine animals, live pure-bred breeding
  - 010290 Bovine animals, live, except pure-bred breeding
- 0103 Live swine
  - 010310 Swine, live pure-bred breeding
  - 010391 Swine, live except pure-bred breeding < 50 kg
  - 010392 Swine, live except pure-bred breeding > 50 kg
- 0104 Live sheep and goats
  - 010410 Sheep, live
  - 010420 Goats, live
- 0105 Live poultry, that is to say, fowls of the species Gallus domesticus, ducks, geese, turkeys and guinea fowls
  - 010511 Fowls, live domestic < 185 grams
  - 010519 Poultry, live except domestic fowls, < 185 grams
  - 010591 Fowls, live domestic > 185 grams
  - 010599 Poultry, live except domestic fowls, > 185 grams
- 0106 Other live animals
  - 010600 Animals, live, except farm animals

02 Meat and edible meat offal
03 Fish, crustaceans, molluscs, aquatic invertebrates ne
04 Dairy products, eggs, honey, edible animal product nes
05 Products of animal origin, nes
06 Live trees, plants, bulbs, roots, cut flowers etc
07 Edible vegetables and certain roots and tubers
08 Edible fruit, nuts, peel of citrus fruit, melons
09 Coffee, tea, mate and spices
10 Cereals
11 Milling products, malt, starches, inulin, wheat glute
12 Oil seed, oleagic fruits, grain, seed, fruit, etc, ne
13 Lac, gums, resins, vegetable saps and extracts nes
14 Vegetable plaiting materials, vegetable products nes
15 Animal,vegetable fats and oils, cleavage products, et

16 Meat, fish and seafood food preparations nes
17 Sugars and sugar confectionery
18 Cocoa and cocoa preparations
19 Cereal, flour, starch, milk preparations and products
20 Vegetable, fruit, nut, etc food preparations
21 Miscellaneous edible preparations
22 Beverages, spirits and vinegar
23 Residues, wastes of food industry, animal fodder
24 Tobacco and manufactured tobacco substitutes
25 Salt, sulphur, earth, stone, plaster, lime and cement
26 Ores, slag and ash
27 Mineral fuels, oils, distillation products, etc
28 Inorganic chemicals, precious metal compound, isotope
29 Organic chemicals
30 Pharmaceutical products
31 Fertilizers
32 Tanning, dyeing extracts, tannins, derivs, pigments et
33 Essential oils, perfumes, cosmetics, toileteries
34 Soaps, lubricants, waxes, candles, modelling pastes
35 Albuminoids, modified starches, glues, enzymes
36 Explosives, pyrotechnics, matches, pyrophorics, etc
37 Photographic or cinematographic goods
38 Miscellaneous chemical products
39 Plastics and articles thereof
40 Rubber and articles thereof
41 Raw hides and skins (other than furskins) and leather
42 Articles of leather, animal gut, harness, travel good
43 Furskins and artificial fur, manufactures thereof
44 Wood and articles of wood, wood charcoal
45 Cork and articles of cork
46 Manufactures of plaiting material, basketwork, etc.
47 Pulp of wood, fibrous cellulosic material, waste etc
48 Paper & paperboard, articles of pulp, paper and board
49 Printed books, newspapers, pictures etc
50 Silk
51 Wool, animal hair, horsehair yarn and fabric thereof
52 Cotton
53 Vegetable textile fibres nes, paper yarn, woven fabri
54 manmade filaments
55 manmade staple fibres
56 Wadding, felt, nonwovens, yarns, twine, cordage, etc
57 Carpets and other textile floor coverings
58 Special woven or tufted fabric, lace, tapestry etc
59 Impregnated, coated or laminated textile fabric

60 Knitted or crocheted fabric
61 Articles of apparel, accessories, knit or crochet
62 Articles of apparel, accessories, not knit or crochet
63 Other made textile articles, sets, worn clothing etc
64 Footwear, gaiters and the like, parts thereof
65 Headgear and parts thereof
66 Umbrellas, walking-sticks, seat-sticks, whips, etc
67 Bird skin, feathers, artificial flowers, human hair
68 Stone, plaster, cement, asbestos, mica, etc articles
69 Ceramic products
70 Glass and glassware
71 Pearls, precious stones, metals, coins, etc
72 Iron and steel
73 Articles of iron or steel
74 Copper and articles thereof
75 Nickel and articles thereof
76 Aluminium and articles thereof
78 Lead and articles thereof
79 Zinc and articles thereof
80 Tin and articles thereof
81 Other base metals, cermets, articles thereof
82 Tools, implements, cutlery, etc of base metal
83 Miscellaneous articles of base metal
84 Nuclear reactors, boilers, machinery, etc
85 Electrical, electronic equipment
86 Railway, tramway locomotives, rolling stock, equipmen
87 Vehicles other than railway, tramway
88 Aircraft, spacecraft, and parts thereof
89 Ships, boats and other floating structures
90 Optical, photo, technical, medical, etc apparatus
91 Clocks and watches and parts thereof
92 Musical instruments, parts and accessories
93 Arms and ammunition, parts and accessories thereof
94 Furniture, lighting, signs, prefabricated buildings
95 Toys, games, sports requisites
96 Miscellaneous manufactured articles
97 Works of art, collectors pieces and antiques
99 Commodities not specified according to kind

Source: United Nations Commodity Trade Statistics Database
http://data.un.org/Explorer.aspx?d=ComTrade&f=_l1Code%3a2

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