

**University of Pardubice  
Faculty of Economics and Administration**

**Transition Impact on Foreign Trade Growth in the Czech  
Republic**

**Ezat Esmaeel**

**Thesis**

**2010**

### **Author's Statement**

I hereby confirm that I have written this paper independently. All the reference literature and information used in the paper are quoted in the list of reference literature.

I hereby acknowledge that all the rights and duties resulting from Act N. 121/2000 Sb., the Copyright Act, apply to my written work, especially that the University of Pardubice has the right to make a license agreement of use of this written work as a school work pursuant to § 60 section 1 of the Copyright Act. On the condition that the written work shall be used by me or a license shall be provided to another subject for the use hereof, the University of Pardubice shall have the right to require from me a relevant contribution to reimburse the costs incurred for the making of such work including all relevant costs and total overall expenditure and expenses incurred.

I express my consent with making the work accessible in the University Library.

Dated in Pardubice on 15<sup>th</sup> March 2010

Ezat Esmaeel

## **Acknowledgement**

Writing a dissertation in the limited time space of only two years and abroad has been one of the biggest challenges in my life. Had it not been for the dedicated help and support of a number of very special people, it would not have been possible, either. First and foremost, I am eternally indebted to my supervisor, Prof. RNDr. Bohuslav Sekerka, CSc., first for agreeing to supervise this work, and more importantly for his generosity to share his excellent ideas with me, and for always making himself accessible to an aspiring researcher like myself. I'm grateful to thank all the staffs in Pardubice University, especially Faculty of Economic and Administration, firstly the dean of the faculty of Economics and Administration doc. Ing. et Ing. Renata Myskova Ph.D.; and then Assoc. Prof. Ivana Kraftova. Ph.D Vice-Rector for Education in Pardubice University; Prof. Ing. Jan Capek. CSc, Vice- Dean for Research; Doc. Ing. Ilona Obrsalova. CSc., Vice- Dean for Development and External Affairs; and lecturers, Prof. Ing. Milan Bucek, DrSc. and Ing. Libena Cemohorska. I'm also grateful to Ing. Starkova Radka Coordinator for Internal Affairs and Development and Bc. Iva Frauenbergova Ms. Coordinator for International students. Special thanks go to CERGE-EI library staff for their cooperation with me in lending books and resources during writing my dissertation work. I also would like to thank my close friend Twana Salih who always been close to me and we studied Ph.D in economy in Pardubice University. I am also thankful to the Faculty of Economic and Administration in the University of sulaimani, especially Dr. Aras Mahmood and library staff. Last, but not least I would like to thank my family who have encouraged me in every single moment of the journey that I embarked as a researcher. Foremost, however, my greatest gratitude goes to my lovely wife Avin for her love and support, without her none of my achievements would have been possible. I dedicate this thesis to my three kids Raze, Tre and especially my son Milan who was born during my Ph.D. study in the Czech Republic.

**Abstract:**

Economic transition in the Czech Republic started in the early 1990s and privatized most of the firms, the ownership of privatized firms reduce the unit of labor cost and increases productivity and then the amount of profit. The Czech Republic government liberalized almost all the prices, privatized most of the economy, decentralized the wage setting, and opened the country to the foreign trade with nearly balanced budget. In general, the transition impact on economic performance in the Czech Republic was positive. In the empirical work, the regression analysis of Czech foreign trade during 1993 to 2008 shows that the exports and imports depending on GD; FD; LW; UR; ER; EC; LR and IR Simultaneously. This model of Czech foreign trade was able to explain 96.3 percent of the variation in Czech exports and 97.5 percent of imports, which is a strong result. In addition, the two significant variables, which have a big relationship with exports and imports, are labor wages and gross domestic product. In addition, the first and the more important sector for the Czech foreign trade share during 1999 to 2008 is Machinery and transport equipment. The first and the more important commodity contributed in Czech foreign trade during the period of study is (Nuclear reactors, boilers, machinery and mechanical appliances).

**Keywords:**

Economic Transition, Foreign trade, Privatization, Sector Share, Multiple Regression model.

# Content

<b>LIST OF GRAPHS .....</b>	<b>8</b>
<b>LIST OF TABLES .....</b>	<b>9</b>
<b>LIST OF ABBREVIATIONS .....</b>	<b>11</b>
<b>INTRODUCTION.....</b>	<b>13</b>
<b>1 CZECH ECONOMY BEFORE THE TRANSITION PROCESS.....</b>	<b>15</b>
1.1 GDPGROWTH.....	18
1.2 PRIVATE SECTOR .....	20
1.3 FOREIGN TRADE.....	21
1.4 UNEMPLOYMENT.....	23
1.5 EXCHANGE RATE.....	24
<b>2 TRANSITION AND ECONOMIC GROWTH IN CZECH REPUBLIC (THEORETICAL FRAMEWORK).....</b>	<b>26</b>
2.1 PRIVATIZATION AND OUTCOMES IN TRANSITION PROCESS.....	26
2.1.1 <i>The process of privatization:</i> .....	27
2.1.2 <i>Positive outcomes:</i> .....	28
2.1.3 <i>Privatization in Czech Republic:</i> .....	29
2.2 TRANSITION AND STRUCTURAL REFORMS .....	32
2.2.1 <i>Economic and Political Support for Reforms</i> .....	32
2.2.2 <i>Reform Characteristics in transition countries</i> .....	34
2.2.3 <i>Reforms in Czech Republic</i> .....	37
2.3 TRANSITION IMPACT ON ECONOMIC PERFORMANCE .....	38
2.3.1 <i>GDP growth</i> .....	38
2.3.2 <i>Inflation rate</i> .....	40
2.3.3 <i>Exchange rate</i> .....	43
2.3.4 <i>Unemployment rate</i> .....	44
2.3.5 <i>Foreign direct investment</i> .....	45
2.3.6 <i>Wages</i> .....	47
2.3.7 <i>Exports and Imports</i> .....	48
<b>3 THE EVOLUTION OF FOREIGN TRADE IN CZECH REPUBLIC.....</b>	<b>50</b>
3.1 ADJUSTMENT OF FOREIGN TRADE FLOWS DURING THE TRANSITION PERIOD .....	50
3.1.1 <i>Theory of trade</i> .....	50
3.1.2 <i>Foreign Trade during the Transition Period</i> .....	51

3.1.2.1	Stage 1: System Transformation .....	52
3.1.2.2	Stage 2: Catching-Up .....	53
3.1.2.3	Stage 3: Integrated Europe .....	54
3.1.3	<i>Czech foreign trade after the accession of EU</i> .....	54
3.2	IMPACT OF FDI ON FOREIGN TRADE IN THE CZECH REPUBLIC.....	57
3.2.1	<i>The Importance of FDI</i> .....	57
3.2.2	<i>FDI and it's impact on the economy in the Czech Republic</i> .....	59
3.2.3	<i>FDI and Foreign trade in Czech Republic</i> .....	60
3.3	EXCHANGE RATE AND GROWTH IN FOREIGN TRADE.....	62
3.3.1	<i>Exchange rate and its regime in transition countries</i> .....	62
3.3.2	<i>Nominal Exchange and Real exchange Rate</i> .....	63
3.3.3	<i>Exchange Rate Regime in Czech Republic</i> .....	64
3.3.4	<i>Appreciation of Czech Currency</i> .....	65
3.3.5	<i>Economic Implications of the Appreciation</i> .....	66
3.3.6	<i>Exchange Rate and foreign Trade in Czech Republic</i> .....	67
3.4	THE IMPACT OF EU MEMBERS ON CZECH EXPORTS.....	69
<b>4</b>	<b>INTEGRATING ECONOMETRIC METHODS AND INPUT-OUTPUT</b>	
	<b>ANALYZE FOR FOREIGN TRADE IN THE CZECH REPUBLIC .....</b>	<b>72</b>
4.1	ECONOMETRIC MODELS FOR TESTING FOREIGN TRADE .....	72
4.1.1	<i>The Importance of Econometrics</i> .....	72
4.1.2	<i>The Simple Regression Model</i> .....	74
4.1.2.1	Definition of the Simple Regression Model.....	74
4.1.2.2	Ordinary Least Squares Estimates (OLS).....	74
4.1.3	<i>The Multiple Regression Model</i> .....	75
4.1.3.1	The Model with k Independent Variables .....	75
4.1.3.2	Interpreting the OLS Regression Equation.....	76
4.1.4	<i>Statistical and Econometric Tests for the Estimated Functions:</i> .....	76
4.2	INPUT-OUTPUT AS A SIMPLE ECONOMETRIC MODEL FOR ANALYZING FOREIGN	
	TRADE.....	80
4.2.1	<i>Input-output basics</i> .....	81
4.2.2	<i>Input-output tables for foreign trade</i> .....	82
<b>5</b>	<b>INTEGRATING ECONOMETRIC METHODS AND INPUT-OUTPUT</b>	
	<b>MODEL TO ANALYZE TRANSITION IMPACT ON FOREIGN TRADE IN</b>	
	<b>THE CZECH REPUBLIC (EMPIRICAL FRAMEWORK) .....</b>	<b>84</b>

5.1	ECONOMETRIC ANALYSIS.....	84
5.2	REGRESSION ANALYSIS OF EXPORTS.....	85
5.2.1	<i>Exports and Macroeconomic Variables.....</i>	87
5.2.2	<i>Exports by Sectors .....</i>	93
5.2.3	<i>Exports by commodity.....</i>	96
5.3	REGRESSION ANALYSIS OF IMPORTS .....	97
5.3.1	<i>Imports and Macroeconomic Variables.....</i>	98
5.3.2	<i>Imports by Sectors .....</i>	103
5.3.3	<i>Imports by commodity.....</i>	106
<b>6</b>	<b>CONCLUSION.....</b>	<b>108</b>
<b>7</b>	<b>REFERENCES.....</b>	<b>112</b>
<b>8</b>	<b>APPENDIX.....</b>	<b>119</b>

## List of Graphs

Figure 2.1: Czech GDP from 1993 to 2008/ bn.CZK .....	40
Figure 2.2: Czech Inflation Rate from 1993 to 2008 .....	41
Figure 2.3: Czech Exchange Rate between CZK/EUR from 1993 to 2008 .....	43
Figure 2.4: Czech Unemployment Rate from 1993 to 2008 .....	45
Figure 2.5: Czech Inflow of Foreign Direct Investment from 1993 to 2008 .....	46
Figure 2.6: Czech Labour Wages in CZK from 1993 to 2008 .....	48
Figure 2.7: Czech Total Exports and Imports from 1993 to 2008/ mill. Czk.....	49
Figure 3.1: Czech Exports and Imports with EU 25/ mill euro .....	55
Figure 3.2: Czech Exports and Imports with EU 27/ mill euro .....	57



## List of Tables

Table 1: Basic Macroeconomic Indicators of the Csfr* .....	16
Table 2: Real Gdp Growth Rates (In %), in Selected Transition Countries .....	19
Table 3: Shares of Sectors on Gdp (In %), in the Czech Republic.....	20
Table 4: Private Sector Contribution to Gdp (In %), in Selected Transition Countries .	21
Table 5: Liberalization and Small Scale Privatization in 25 Countries .....	30
Table 6: Progress of Large Scale Privatization in 1992-1993* .....	31
Table 7: Countries in Transition: Indicators of Economic Growth, Liberalization and Democracy.....	34
Table 8: Annual Inflation Rate, Output Growth and Real Exchange Rate Changes in Selected Transition Economies 1990–1995, % per Year .....	36
Table 9: Macroeconomic Indicator's after Transition in the Czech Republic .....	39
Table 10: Current Macroeconomic Indicators in the Selected Group of Transition Countries.....	42
Table 11: Gdp Per Capita for Four Ceecs (At Current Ppps, Us\$; % of Eu (15) (Average).....	53
Table12: Balance Of Trade in Czech Republic with Eu25 and Eu27/Mill Euro.....	56
Table 13: Fdi And Macro Variables in the Czech Republic From 1996 To 2006.....	61
Table 14: Exchange Rate Regimes in Selected Ceecs .....	63
Table 15: Monetary Indicators in the Czech Republic.....	65
Table 16: Exchange Rate and Foreign Trade in Czech Republic .....	68
Table 17: Evolution in Volumes Traded and Unit Prices in the Czech Exports and Imports with the Eu.....	71
Table 18: Foreign Trade by Sectors in the Czech Republic for Years 2007, 2008 .....	83
Table 19: Macroeconomic Indicators and Foreign Trade in the Czech Republic from 1993 To 2008.....	86
Table 20: Discription of The Variables.....	87
Table 21: Standarized Table of Exports and Macroeconomic Indicators in the Czech Republic from 1993 to 2008.....	88
Table 22: Estimation of Equation (5.1), Regression Analysis of Exports and Macroeconomic Variables.....	89
Table 23: Estimation of Equation (5.2), Regression Analysis of Exports and.....	90
Macroeconomic Variables.....	90

Table 24: Codes of the Sectors in the Czech Economy .....	94
Table 25: Czech Exports by Sectors from 1999 to 2008/ Mill.Czk.....	94
Table 26: Czech Exports by Sector Shares from 1999 to 2008.....	95
Table 27: Czech Exports by Sector Shares And It's Importance from 1999 to 2008 .....	96
Table 28: Czech Exports by The Most Important 10 Commodity Shears from 1999 to 2008.....	97
Table 29: Standarized Table of Imports and Macroeconomic Indicators in the Czech Republic from 1993 to 2008.....	98
Table 30: Estimation of Equation (5.9), Regression Analysis of Imports and Macroeconomic Variables.....	99
Table 31: Estimation of Equation (5.10), Regression Analysis of Imports and Macroeconomic Variables.....	100
Table 32: Estimation of Equation (5.11), Regression Analysis of Imports and Macroeconomic Variables.....	101
Table 33: Estimation of Equation (5.12), Regression Analysis of Imports and Macroeconomic Variables.....	102
Table 34 : Czech Imports by Sectors From 1999 to 2008/ Mill.Czk.....	104
Table 35 : Czech Imports by Sector Shares From 1999 to 2008.....	104
Table 36: Czech Imports by Sector Shares And it's Importance from 1999 to 2008....	105
Table 37: Czech Imports by the Most Important 10 Commodity Shears from 1999 to 2008.....	106

## **List of Abbreviations**

GDP - Gross Domestic Product  
PPPs - Purchasing Power Parity  
CR - Czech Republic  
CZSO - Czech Statistical Office  
CNB - Czech National Bank  
SITC - Standard International Trade Classification  
OLS - Ordinary Least Squer  
I-O - Input-Output  
IOA - Input-Output Analysis  
CEE - Central and Eastern Europe  
FDI - Foreign Direct Investment  
OBCA - Objective Budget Constraint and Principal-Agent Problem  
EEC - Eastern European Countries  
EBRD - European Bank for Reconstruction and Development  
CZK - Czech Currency (Crown)  
EU - European Union  
CPI - Consumer Price Index  
USD: United States Currency (dollar)  
OECD - European Bank for Reconstruction and Development  
CEECs - Central and East European Countries  
GNP - Gross National Product  
CMEA - Council for Mutual Economic Assistance  
EUR - European Union Currency (Euro)  
R&D - Research and Development  
CERGE-EI - Center for Economic Reaserch and Graduate Education-Economic Institute  
EMU - European Monetary Union  
CSK - Czechoslovak Crowns  
WEC - Western European Countries  
COMECON - The Council for Mutual Economic Assistance  
HS - Harmonized System of Classification  
WIIW - The Vienna Institute for International Economic Studies  
IMF - International Monetary Fund

CSFR - Czech and Slovak Federative Republic

NBS - National Bank of Slovakia

SKK - The Slovak Crown

USSR - The Union of Soviet Socialist Republics

## **Introduction**

In 1989 the former Czechoslovakia had one of the smallest private sectors in the communist world, employing only about 1.2% of the labor force and producing a small fraction of the national output. Since 1948 the country had evolved in the command system. Moreover, since the government had followed a hard-line socialist approach, no real attempt to reform the economy or question its underlying political system occurred prior to 1989. Within five-year plans quantity was preferred to quality, and mainly put on the production of machinery while consumer goods and services were in shortage and of low quality.

In the early 1990s, countries of Central and Eastern Europe (CEE) started with remarkable economic transition from a centrally planned system to one based on decentralized decision-making and markets. The process of transition attempts to decentralize, stabilize, and restructure these economies. Within first five years of transition the outcomes was varied, with all countries decentralizing but only few achieving notable success in macroeconomic stabilization and restructuring. Czech Republic was one of the successful countries, which experienced the economic transition. Moreover, the Czech policy makers have transformed a highly centralized and mostly state owned economy into one based almost completely on market principles and private ownership. The Czechs have gone further than other countries; they also pursued restrictive macroeconomic policies and succeeded in maintaining a relatively stable economy.

Hanousek and Kocenda, (2005), stated that the economic transition leads to privatization process in the Czech Republic, this process carried out in the first half of 1990s three different kinds of privatization: restitution, small-scale privatization, and large-scale privatization. The first two kinds started in 1990 and were important for during the early years of transition, and large scale privatization which is the most important kind, began in 1991 and was completed in early 1995. The ownership of privatized firms reduces the unit of labor cost and increases productivity and then the amount of profit. The major development in the transformation of the industrial sector was the entry of foreign firms or foreign investment either through FDI or through contract agreements. The importance of FDI for the transition economies are likely to bring in new capital and new technology, then to increase employment and gross domestic product and to improve in the longer run the host country balance of payment.

Some of these positive effects of FDI are supposed to have the indirect positive effects that can have on the rest of the economy, especially on the related upstream and downstream industries. This positive effects from FDI leads to: in one hand, increases the productivity which increases the level of wages for employment and then increasing the aggregate demand for domestic and foreign goods as well which means increasing import goods. In the other hand, FDI will give the transition country new technology, which increases the production in both quality, and quantity, this increase in production will increase the level of exports especially for the EU members because of the improvement in the quality rather than quantity.

The evolution of exports and imports in the Czech Republic has two basic components: the common macroeconomic background (GDP at home and the real exchange rate) and industry-specific technology, factor supply, market structure and barriers to trade. The analysis of the Czech foreign trade addresses both the macroeconomic and the microeconomic factors of growth and quantifies their general impact on industries or even enterprises. While the macroeconomic variables assumed main drivers of overall trade growth, the microeconomic variables are associated with structural developments Vladimír, Jiří, and Ladislav, (2005).

In the case of Czech Republic, opening and liberalization of Czech economy lead up to new specialization patterns according to comparative advantages relative to the new trade policy. Moreover, Czech exports rely mainly on sales of standardized goods where the price is the most dominant criterion of choice. Czech Producers would therefore force to rely their production to the relative factor proportions of the economy, employing the most productive people and cheapest production factors. The most advanced Czech industries embark upon a process of catching up advanced technological market economies, and they will be likely increasingly to conduct intra-industry rather than inter-industry trade, Bohata and Fischer, (1995).

The objective of this dissertation work is to analyze the Czech foreign trade after the economic transition in the Czech Republic, the hypotheses of the research is; the impact of economic transition in the Czech Republic is positive on foreign trade. The aim of this dissertation work is to analyze which sector and exactly which commodity of the economy have more impacts on foreign trade by using the Input-Output analyze method, and to show which macroeconomic variable contributing more than the other variables in the growth of foreign trade in the Czech Republic by using the Econometric Multiple Regression Model.

# **1 Czech economy before the transition process**

The Collapse of the command system in the economies of Central Europe and the following disintegration of the former Soviet empire have brought unexpected changes to nations in Central and Eastern Europe. The Czech Republic embarked on an uneasy path of reform from plan to market economy in 1990 and even at such an early stage it became clear that switching regimes would entail more than a single reform. It is more precise, to speak of regime transformation as consisting of several reforms executed in a parallel or subsequent fashion, often determined by political rather than economic forces. Many conditions have determined the reform path taken in years following the break-up of the command system. Difficulty of the reform process itself has involved a strong path-dependency of outcomes as well as various steps complementing major reforms that were taken later on as the transformation progressed. In 1989 the former Czechoslovakia had one of the smallest private sectors in the communist world, employing only about 1.2% of the labor force and producing a small fraction of the national output. Since 1948 the country had evolved in the command system. Moreover, since the government had followed a hard-line socialist approach, no real attempt to reform the economy or question its underlying political system occurred prior to 1989. Within five-year plans quantity was preferred to quality, and mainly put on the production of machinery while consumer goods and services were in shortage and of low quality. Specialization within the former Soviet bloc was on heavy industry, for which the Czech economy did not possess any comparative advantage. Information about the economy administrated by setting prices that conveyed very limited information about cost structure. Over-employment was part of the command system and effectively meant a waste of human resources. Due to the above pre-conditions, self-reliance among the population was extremely low and economic structures over centralized, Hanousek, Kocenda, and Lizal, (2004).

The pre-war economic level of Czechoslovakia was quite comparable with such countries as Germany, France, Belgium and Austria. According to the statistical data on industrial production, before World War II Czechoslovakia was one of the ten industrialized countries in the world. However, during the post-war period up to 1989, the allocation of resources through central planning rather than the market mechanism resulted in a long-term slowdown in productivity and the standard of living, as well as

in the last 20 years of central planning in particular, czechoslovakia's economic performance has been disappointing.

After the exhaustion of extensive source of growth, clear tendencies towards stagnation and decline in production were already appearing. The disintegration of the market of the former CMEA hastened the inevitable collapse of the socialist system. The transition to a market economy has been, given this situation, the only effective way of tackling the problems which have accumulated.

**Table 1: Basic macroeconomic indicators of the CSFR\***

Indicators (in constant prices)	Average annual change, in %	
	1970-1980	1980-1990
Gross domestic product	4.77	1.50
Net material product produced	4.66	1.31
Gross material product produced	4.84	1.81
Gross material product distributed	4.30	1.98
Personal consumption	3.22	1.69
Material social consumption	5.52	4.84
Gross fixed investment	5.77	0.89
Consumer price index	1.14	2.17
Average nominal wages	3.13	2.08
Average real wages	1.99	-0.09
Labor productivity on material sector	4.48	1.65
Fixed capital productivity in material sector	10.95	-2.89
Import intensity of gross material product	-0.37	-0.07
<b>Indicators corrected for hidden inflation</b>		
Gross domestic product	2.7	-0.7
Net material product	2.1	-1.5
Personal consumption	1.5	0.4
Gross fixed investment	3.1	-5.1
Consumer price index	2.8	3.5
Average real wages	0.3	-1.4

Source: Statistical yearbook of Czechoslovakia

\* Czech and Slovak Federative Republic



The considerable decline of the Czechoslovak economy during the eighties, as compared with the previous decade, is shown from table 1. The average annual growth rate of real GDP contracted from 4.8 to 1.5%. A similar slowdown occurred in other macroeconomic indicators including average wages, productivity of labour and productivity of fixed capital. On the other hand, inflation (expressed by the CPI) speeded up. According to the Czech Statistical Office, the real macroeconomic growth rate indicators in the CEMA countries given by official statistics were systematically overvaluated as corresponding deflators were undervaluated. The last six rows in table 1 contain the growth rates corrected for estimated hidden inflation. In the period of 1970-1980 they were just about a half of the official estimates and between 1980-1990 they were negative or close to zero. The most severe decline occurred in gross fixed investment. Corrected average real wages were in stagnation during the seventies and decline during the eighties.

Sujan and Sujanova (1993) stated that, the serious problem was deformation of the industrial structure of the Czechoslovak economy. According to the author's econometric analysis covering 20 industries in 10 countries during 20 years, the industrial structure in developed market economies depends primarily on the economic level and size of the country. Using estimated parameters from this analysis and actual data on Czechoslovakia's economic level (real GDP per capital) and size (volume of real GDP), the shares of mining, metallurgy, machinery and production of transport equipment in total industrial production were too high, while the shares of the food industry, furniture, printing and the energy industry were too small. These differences cannot be explained by specific natural conditions. They are just deformations following from central planning and the CEMA system.

The difficult task of the reform path from central plan to market has been redesigning the role of the state. Prior to 1989, state authorities regulated virtually all, not only economic, activities in the society. It was obvious at the beginning of the transition that the scope of the state's activities needed to be heavily reduced but simultaneously its efficiency in providing standard public services needed to be strengthened. On the one hand, the direct state role in the economy by central planning to be reduced, trade and exchange regime control, and direct control of enterprises and banks was supposed to fade away. On the other hand, the state could not give up its rules setting and enforcement role or its role in ensuring the citizens' access to public goods and services, La Porta (1997). In this part we are concerning in some macroeconomic indicators

before the transition process and to compare it later with the Czech economy after the transition process:

### ***1.1 GDP growth***

The implementation of economic transition from the Soviet-type economy to a free market one, the stabilization of macroeconomic policies and the collapse of intra-CMEA trade were followed by a steep decline in economic activity from 1990 to 1992 (measured by real GDP and industrial production). However, this change was preceded by a decade of economic stagnation, Klacek and Hajek (1989). This economic decline or transformational recession is an unavoidable for closed economy to a more efficient, open one. The depth of the transformational recession also depends on the overall transformation strategy and the nature of economic policy, Winięcki (1993).

The real GDP of the Czech Republic In 1990, decreased by 1.2% over the previous year, by 14.2% in 1991 and by a further 6.4% in 1992 as shown in table 2 . This economic decline continued through the first half of 1993, while in the third quarter some faint signals of recovery appeared. This decrease in industrial output is not so large if measured in value-added terms. A detailed analysis reveals that during the 1991-1992 periods, all elements of aggregate demand declined. The fall in domestic aggregate demand was accompanied by the dramatic collapse of the CMEA market (compensated partly by increasing exports to the West European markets, especially to the European countries). The deep transformational recession in the 1990-1992 periods, was not accompanied by a corresponding decline in employment. A very low rate of unemployment has been a specific feature of the Czech economy as compared to other economies in transition as well as to developed market economies. This striking difference between the tendencies in the development of output and unemployment cannot, however, last for long and may be explained mainly by the slow restructuring at the micro level, Novotny (1993).

**Table 2: Real GDP Growth Rates (in %), in selected transition countries**

year	Czech Republic	Hungary	Slovenia	Slovakia	Poland
1990	-1.20	-3.5	-4.7	-2.5	-11.6
1991	-14.20	-11.9	-8.1	-14.5	-7.0
1992	-6.40	-3.1	5.4	-6.5	2.6
1993	-0.94	-0.6	1.9	-3.7	3.8
1994	2.62	2.9	4.9	4.9	5.2
1995	4.84	1.5	3.5	7.4	7.0
1996	4.70	2.1	3.2	6.3	6.9

Sources: CNB, UNO, 1996 CERGE estimates

According to Sojka (1994), in the second half of 1992 and in 1993 the co-existence of both the symptoms of recession and some signs of economic recovery become visible. Industrial output fell by 10.6%, (large state-owned enterprises experienced a further decrease in output, while in smaller ones and in the private sector the output rose). In 1992, output in construction increased by 22.0% (this being due mostly to contracts abroad). The upturn in economic activity was located in the private sector, but because of its low share in GDP formation thus far its dynamics were overbalanced by declining trends in the state sector. In 1993, the GDP stagnated, while industrial production decreased further (preliminary data shows a decrease of about 5% with some decrease in construction as well).

Table 3 shows that, since the beginning of the transformation the service sector has experienced the largest boom, especially in tourism sector. Services currently contribute to more than half of the GDP. The service sector has increased its share by more than 30% since 1991. Agriculture has declined slightly responding to a weakness in the government agricultural policy. At first look, construction is not exactly having a large increase. However, its steady share following its original decline and eventual increase in the growth of output suggests yet unexplored possibilities of this sector. Industry paid the heaviest toll due to structural changes and the breakup of long-lasting manufacturing and trade patterns. Its continuously declining share should not leave us in good macroeconomic descriptions, because not only theoretical macroeconomics has its foundations in microeconomics.

**Table 3: Shares of Sectors on GDP (in %), in the Czech Republic**

Year	Agriculture	Industry	Construction	Services
1991	6.0	47.4	6.8	39.8
1992	6.1	42.9	5.3	45.8
1993	6.5	37.0	5.2	51.3
1994	5.8	34.8	5.9	53.5
1995	5.3	34.6	6.2	54.0
1996	5.1	34.7	6.6	53.6

Source: CNB, 1996, CERGE estimate

## ***1.2 Private sector***

After the Economic stabilization, the transformation reforms were launched. The reform was important to increase the share of private ownership (state ownership is connected with low efficiency) via privatization and support for small and medium enterprises. Creation of the institutional and legal framework that would support entrepreneurial activities and smooth the transition from the command towards the market was to complement the transformation process as a non-economic reform, was extremely the important one. Yet privatization was not the only way of creating private sector output. Throughout the early transition period new private firms were also being created. While early on credit to small firms may have been generous, retained profit was a major determinant of new investment. Small firms were apparently the force behind low Czech unemployment. Survey evidence suggests that new small private firms were responsible for almost all of the Czech job creation during early reforms, such that five years into transition small firms offered more jobs than both the state and privatized firms combined, Svejnar (1995).

The economic growth is not possible without private investments. After some periods, connected with the beginning of the transformation, investments started to rise steadily. Fixed investments have recently grown at a very high rate. The rate of gross investments has been even higher, indicating a substantial positive increase in stocks. New investments in machines and equipment have been more frequent than those in buildings and construction. However, the largest investment increases have been registered in communications and mining. An especially promising revitalization has recently occurred in the manufacturing industry. Strong investment activity has emerged, particularly, in the paper industry, metallurgy and electrical engineering. Textile, food, and chemical industries have recorded some investment acceleration as

well; and a decline was registered in non-financial firms: construction, catering and accommodation, CERGE-EI, (1996).

The first registrations of private entrepreneurs took place in mid-1990 due to the new trades licensing Act. The district statistical bodies were responsible for the share of identification numbers. This agenda accounted for about 20% of their working capacity in 1990 and 1991. It was difficult to distinguish between real entrepreneurs and those who only possess identification numbers. According to Czech statistical office, only 788653 out of 1119400 registered entrepreneurs in December 1993 were really doing businesses, about 30% of the statistically registered were 'dead souls', mainly in construction, retail trade and other business service. Table 4 shows Private Sector Contribution to GDP (in %), in selected transition countries, Jilek (1994).

**Table 4: Private Sector Contribution to GDP (in %), in selected transition countries**

<b>Year</b>	<b>Czech Republic</b>	<b>Bulgaria</b>	<b>Hungary</b>	<b>Poland</b>	<b>Romania</b>
1990	12	9	25	31	16
1991	17	12	30	42	24
1992	28	18	42	45	26
1993	45	25	50	48	32
1994	56	30	60	70	39
1995	64	32	68	75	45
1996	74	34	75	78	50

Source: IMF, 1996 CERGE estimates

### ***1.3 Foreign Trade***

In the Czech Republic, Foreign trade has played a fundamental role for the Czech economy during the post- 1989 period. Foreign trade liberalization implemented at the very beginning of the transition was important for both the reorientation from traditional CMEA trading partners towards the EU and for increasing competition on domestic markets. Following a major decline in exports in 1990-91 primarily caused by the dismantling of the CMEA and the collapse of the Soviet market, exports of the Czech Republic have risen steadily. This was facilitated by the Association Agreement with the EU, signed by Czechoslovakia in 1991 which subsequently, after the split with Slovakia, was transformed into two separate agreements in October 1993. The Association Agreement enabled duty-free access for most industrial goods from the Czech Republic to EU markets, thus greatly facilitating the very quick reorientation of

its foreign trade towards primarily EU countries. Whereas in the past, about two-thirds of Czechoslovakia's foreign trade has been carried out with CMEA countries (one-third with the USSR alone), by 1993 the share already dropped to 20 per cent. During the 1990s, foreign trade became a modest engine of growth, when Germany had replaced Russia as the main trading partner. The composition of Czech foreign trade has radically changed. The share in exports of machinery and transport equipment has doubled since 1993, while raw materials and semi-finished products have shrunk in similar proportions, Svejnar (1995).

The transition of Czech foreign trade, by diverting its flows from the East to the West, was completed already in 1994. The geographic trade pattern in 1995 is not very different from the pattern in 1928. With German-speaking countries scoring a 50% share of total Czech exports, there is no doubt about what the center of gravity of the Czech external economic orientation is. Similar picture can be given by analyzing the inflows of foreign direct investment. Czechs originally looked upon the separation from Slovakia as a move to free their hands from a totally unsuccessful Eastern legacy and to concentrate on a speedy Western convergence. Surprisingly, this sacrifice has given hardly any advantage to the Czech political scene. The opposite is true: the disintegration of Czechoslovakia was detrimental to both countries due to their shrinking market size and increasing transaction costs in their mutual trade. Also, by decreasing the domestic Czecho-Slovak competition, the pressure for efficiency in both the Czech government and domestic firms has declined, Zemplerova and Benacek (1997).

During the first wave of the transformation processes a radical adjustment of trade, services and capital flows began to materialize. This process should implement the shift from the distorted structures, which arose under the Soviet-type economy framework, to standard market-determined patterns of trade and capital flows, reflecting underlying comparative advantages. A substantial percentage of Czech exports are resource-based, low value-added products and standard labour intensive and relatively low-skill manufactures. After the heavy devaluations of the Czechoslovak crown in 1990, iron-metallurgy, basic chemicals and similar intermediate products were able to find new export markets relatively quickly, as their competitiveness increased. The prospect of further increases in the export of these products are only modest, as in these branches international demand is weaker, the competition between developing countries particularly strong and all accompanied by strong pressures in favor of protectionism in

response to overproduction and/or unemployment. The existing patterns of the Czech exports can only change in the medium and long-run in connection with the new rebuilding of the Czech economy, which will bring about an upgrading of production and export structures. This process could create conditions for a recovery of the Czech Republic's share in world markets, Hrneir (1993).

The breakdown of the foreign trade state monopoly in mid-1990 and the expanding number of foreign trade license holders contributed to substantial changes in the surveying of foreign trade. Previously, about 50 specialized state organizations (joint stock companies) were authorized for foreign trade operations and therefore these were respondents who were able to inform on the operations, in all their stages-agreement, delivery, cash. Regular custom statistics were introduced from January 1, 1991. the nominal price indices for exports, as for imports, based on data collected from specialized foreign trade firms, were used up to the end of 1991. after that, unit value indices were introduced because the custom statistics methodology made this possible, and because it was difficult to follow the current role of many newly engaged firms in foreign trade, Jilek (1994).

#### ***1.4 Unemployment***

The rate of unemployment and the situation in the labour market are the outcome of a number of mutually intertwined factors. The present tendencies encountered in unemployment data (a relatively modest increase in 1991, a decrease in 1992 and a moderate increase in 1993) are the result of the very specific conditions existing in the present stage of the transition process in the Czech national economy. The most important of these being, Hajek (1992):

1. before the transformation process, a behavioral pattern encountered frequently in state-owned enterprises. In this sector, even under changing conditions, we can observe a tendency towards an increase in social over-employment in 1991-1992. Large enterprises with more than 1000 employees have had the decisive share in output - over 70% in 1992.
2. The absent disciplining of enterprises through bankruptcies until April 1993.
3. The changes in institutional conditions for granting unemployment benefits.
4. The high devaluation of the Czechoslovak crown at the end of 1990 creating suitable conditions for competitiveness, mostly in traditional industries, and helping reorientate Czechoslovak foreign trade to Western markets.

5. The increasing economic activity in the private sector, especially in services, construction and transport.
6. The growing efficiency of labour offices and active employment policies alleviating the situation, especially for young people.
7. The migration for jobs abroad (especially in Western Bohemia).

Due to all the above mentioned factors, unemployment has, been quite low in the Czech Republic; however, some important regional differences exist. As empirical data show, unemployment tends to increase from the western regions to the eastern regions of the Czech Republic. The parts hit hardest by unemployment are Northern and Southern Moravia, with respective unemployment rates of 4.57% and 2.93%, as well as Northern Bohemia with 3.11%. In Prague, the rate of unemployment was about 0.24% while in all other Bohemian regions it moves between 1.89 and 2.76%. These unemployment data are from June 30, 1993, when the unemployment rate in the Czech Republic reached 2.63%. At the end of 1993 the unemployment rate reached 3.2%, Sojka (1994).

### ***1.5 Exchange rate***

In the period of the planned regime the domestic markets were almost completely isolated from economic impact of external markets; free foreign trade did not exist. There were three different exchange rates under this regime. An official exchange rate; first for external use; second for domestic business, the state businesses and its co-operatives and a third for citizens. In 1990 there were the first preparatory steps taken in moving towards a market economic system. For the exchange rate, the national bank devaluated 24 Czechoslovak crowns (CSK) to 1 USD and it immediately changed to 28CSK/1USD, this in hopes of helping international trade. Development after 1991 marked a period of currency appreciation in real terms year after year. The cause of the real appreciation under the stable nominal exchange rate regime was due to the differences in inflation between the rate in the Czech Republic and that of the Western European countries. It made it harder for exporters to make a profit after the decline in the favorable economic conditions that were created after the devaluation in 1990 and the reduction in demand affected their biggest trade partners most. Any situation that made it harder to trade with Germany (43% of exports in 1999) or any of the EU countries (59.9% of exports in 1997) would have adverse affect on the entire Czech economy, Blaikie (2001).



According to Blaikie (2001), the Slovak crown has faced much of the same challenges at being stable as the Czech currency. It clearly followed the same policies when the currency was the CSK and since 1993 until October 1998 the National Bank of Slovakia (NBS) was fixing the currency. The Slovak crown from July 1994 until October 1998 was pegged on a basket of two currencies, 60% consisted of the DEM and 40% USD. The difference between the resulting rate and its theoretical value, calculated according to that currency basket was not to exceed 7%. In April of 1996 the NBS stopped publishing multiple exchange rates as under the totalitarian regime of the past. In October of 1998 the fluctuation band and currency basket of the SKK was abolished. The exchange of the SKK is now determined by demand and supply on the inter-bank FX market only. On January 1, 1999 the Euro was established as an anchor currency, this as a part of one of the many steps in accession into the EU.

## **2 Transition and Economic Growth in Czech Republic (Theoretical framework)**

### ***2.1 Privatization and Outcomes in Transition Process***

The economic transition in central and Eastern Europe (CEE) started in the early 1990's. Most of the researchers believed that it will be going with a recession caused by both the restrictive macroeconomic policies and by the restructuring of the economy required by the shift from socialism to the market economy. It was not clear how long this recession will continue and when the economic growth would begin. That would depend of initial conditions facing the economy including external influence, foreign direct investment (FDI), economic policies and internal shocks, Fischer, Sahay, and Vegh, (1996).

Pistor (1999) stated that the real gains from privatization it is not coming just from the change-of-title reforms, but it is coming from complementing (combining) change-of-title reforms with the pressure of firms to improve their productivity and profitability by implementing OBCA reforms, then the economic performance of the country will improve. Furthermore, Pistor pointed out that the gains from change of ownership will likely depend on how a countries legal, regulatory, and institutional environment addresses agency-related issues. These issues can be classifying into three types; the first relates to the firm's objective (O); and how to maximize their profits. The second relates to the firm's budget constraint (BC). The third relates to the firm owners and how they are able to monitor and control enterprise managers, the so-called principal-agent (A) problem.

Zinnes, Eilat, and Sachs (2001) suggest that gains from privatization at the level of macroeconomic performance depend on complementary policies, and not just those related to appropriate institutions. While privatization means the ending of subsidies, which drain state finances, privatization also means the state will lose its share of enterprise profits unless complementary reforms create an adequate tax code and administration. The potential for efficiency gains from privatization requires price and wage liberalization in order to create a price system that reflects economic performance. In the same time, unless privatization accompanied by reforms to liberalize the current and capital accounts, maybe the newly privatized domestic firms are not able to gain access to foreign markets, skills, and necessary financing for their economic success, which means kind of challenges. Another negative impact from privatization on

economic performance, unemployment may increase over and above what expected from the resource reallocation associated with enterprise restructuring suggested by the microeconomic perspective. This may occur if privatization leads to decrease employment rate, as managers are free from political interference and return to profit maximization as their principal objective.

### **2.1.1 The process of privatization:**

Over the years, privatization has taken many meanings. In its purest form, the term refers to the divestiture of government owned assets like airports, rail systems, real estate holdings, and oil production facilities. As the concept has evolved, privatization has grown to resemble more of an umbrella term to account for greater private sector participation in the delivery of services. According to Reason Foundation Report (2006), over 1,000 local governments in the United States have entered into public-private partnerships for water services, contracting out the operations and maintenance of water systems to private companies. Similarly, multi-billion dollar public-private highway, bridge, and tunnel projects are operating or under construction across the United States, in Australia, Canada, Italy, France, and other countries.

Privatization process introduces market-based competition into government where it otherwise does not exist. Competition benefits the public by offering expanded choices, higher quality services, and lower costs. Privatization exposes things we otherwise would not see—ideas, processes, innovations in service delivery. Within government rarely is success adequately rewarded, and innovation and new ideas often quashed. While, privatization brings competition, accountability, and a chance for customers to have excellent goods and innovation are rewarded, and mediocrity and failure are penalized, Gilroy (2001).

Tirole (1991) states that the goal of all transition countries is the market economy, these countries cannot function without significantly large private sectors. The literature concerned with the modeling of privatization as recommendation for transition countries. Tirole breaks the privatization process into four periods. The first called definition period, where firms rationalized, a social safety net created, a new system of laws implemented and holding companies (funds, which will play the role of institutional owners) created. The second is the private restructuring period, during which holding companies restructure firm; the government sets a timetable for trade liberalization and completes the legal system. Firms put modern accounting structures

in place and foreign capital is attracted. The third period is the inception of the stock market where holding companies, newly created firms, other institutional investors, and possibly foreigners bite on each firm. The last is the market period; markets for the firms, holding companies, stocks are open to all citizens, foreigners and other investors. Trade liberalization is completed and the government loses its right to vote on the board of directors of holding companies. Thus, the domestic capital market starts to function.

### **2.1.2 Positive outcomes:**

According to Gomulka (1994), major achievements of the countries concerned during the transition process would be as follows:

- Disappearance of shortages as a result of price liberalisation:

One of the remarkable outcomes of the reforms has been the very high speed at which microeconomic equilibrium were restored once administrative price controls were lifted. Kornai (1993) stated that shortages are an imminent feature of any economy with a predominant state sector subject to soft budget constraints, whatever the price regime, has apparently turned out to be wrong. A further consequence has been the disappearance of various shortage-related phenomena: forced substitution in consumption and production, monetary overhang, forced saving, excessive inventories, the humiliation and cost of long queues, and shortage-related bribes.

- Higher dollar wages and better access to import.

After ending, the problem of shortage in economy there has been an improvement in the choice and quality of the domestically produced goods and services. Moreover, real wages declined, the reforms have typically brought an increase in the dollar wage and consequently improved access of consumer's foreign goods.

- Better access to foreign technology.

The higher dollar purchasing power and increased FDI have insured the countries access to foreign technology and skills. Large benefits from this access can be seen in telecommunications, banking, trade and the mass media.

- Improvement in skills.

Incentives to acquire or improve the right skills and work hard have become much stronger. There is consequently a better use of technology especially in private sector.

- Improved product composition.

The structure of the transition economies output in terms of the broad sectoral pattern and products within sectors, has changed substantially in the required direction.

- Increased external creditworthiness.

Most of the transition countries have increased international reserves and lowered their debt/export ratios. The combined benefits listed above vary among the post communist countries because of a rapid growth of the private sector in these countries.

### **2.1.3 Privatization in Czech Republic:**

The important part of the economic reform is voucher privatization, the main economic reasons for its application are relatively quick and it is the substitute of the financial market, which usually not well developed in Eastern European Countries. The Czechoslovak (later Czech) government began the process of privatizing companies, this privatization started into two schemes; small privatization and large privatization. The basic principle of small privatization is that all domestic and foreign firms and all domestic and foreign individuals can make privatization proposal to every state-owned firm, or some part of it, or a proposal to join several state owned firms together. The proposal of privatization judged by the privatization committee established on the local base from deputies of municipalities, employers associations, and financial offices. Public auctions were the main methods applied in small privatization and it was more than 85% of the property, direct sales to predetermined investors, and transfers to municipalities.

According to Kotrba (1994), small-scale privatization contains small firms, which sold in public auctions. Law for small privatization adopted after restitution legislation, and the first auctions started in second quarter of 1991 and the last one in late 1993. Small-scale privatization used for privatization of whole companies and some property separated from state owned enterprise and sold separately; table1 shows liberalization and small-scale privatization in 25 countries. The income, which is coming from privatization, deposited at special accounts of fund of national property.

**Table 5: Liberalization and small scale privatization in 25 countries**

Countries	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
<b>Albania</b>	1.0	1.0	1.3	2.7	3.3	3.3	3.7	3.7	3.7	3.7	3.7
<b>Armenia</b>	1.0	1.0	1.0	2.2	2.3	2.4	2.9	3.3	3.3	3.4	3.4
<b>Azerbaijan</b>	1.0	1.0	1.0	1.3	1.7	1.7	2.0	2.3	2.8	3.1	3.2
<b>Belarus</b>	1.0	1.0	1.0	1.3	1.7	1.7	2.3	2.3	2.0	1.7	1.6
<b>Bulgaria</b>	1.0	1.3	2.3	2.3	2.6	3.0	3.0	3.0	3.3	3.3	3.6
<b>Croatia</b>	2.3	2.7	3.0	3.0	3.3	3.7	3.7	3.8	3.8	3.8	3.8
<b>Czech Republic</b>	1.0	1.0	3.0	3.7	3.7	3.7	3.7	3.9	3.9	3.9	3.9
<b>Estonia</b>	1.0	1.3	1.7	2.3	3.0	3.7	3.7	3.8	3.8	3.8	3.8
<b>FYR Macedonia</b>	2.3	2.7	3.0	3.0	3.0	3.7	3.7	3.7	3.7	3.7	3.7
<b>Georgia</b>	1.0	1.0	1.0	1.6	2.0	2.0	2.7	3.3	3.7	3.7	3.7
<b>Hungary</b>	1.7	2.0	2.7	3.0	3.3	3.7	3.7	3.8	4.0	4.0	4.0
<b>Kazakhstan</b>	1.0	1.0	1.0	1.7	2.0	2.1	3.0	3.4	3.7	3.7	3.3
<b>Kyrgyzstan</b>	1.0	1.0	1.0	2.0	2.7	3.3	3.7	3.7	3.7	3.7	3.7
<b>Latvia</b>	1.0	1.0	1.3	2.3	3.0	3.7	3.7	3.7	3.7	3.7	3.8
<b>Lithuania</b>	1.0	1.3	1.3	2.2	3.1	3.7	3.7	3.7	3.7	3.7	3.8
<b>Moldova</b>	1.0	1.0	1.0	1.9	2.0	2.3	3.3	3.3	3.3	3.4	3.4
<b>Poland</b>	1.7	3.0	3.0	3.3	3.7	3.7	3.7	3.9	3.9	4.0	4.0
<b>Romania</b>	1.0	1.0	1.3	2.3	2.7	3.1	3.2	3.0	3.4	3.4	3.6
<b>Russia</b>	1.0	1.0	1.0	2.7	3.0	3.0	3.3	3.7	3.7	3.0	3.0
<b>Slovak Republic</b>	1.0	1.0	3.0	3.7	3.7	3.7	3.7	3.9	3.8	3.9	3.9
<b>Slovenia</b>	2.3	2.7	3.0	3.0	3.7	3.7	3.7	3.9	4.0	4.0	4.0
<b>Tajikistan</b>	1.0	1.0	1.0	1.7	1.6	1.6	2.2	2.3	2.4	2.9	2.9
<b>Turkmenistan</b>	1.0	1.0	1.0	1.0	1.0	1.2	1.6	1.6	1.7	1.7	1.7
<b>Ukraine</b>	1.0	1.0	1.0	1.0	1.3	1.7	2.7	3.0	3.1	3.0	3.1
<b>Uzbekistan</b>	1.0	1.0	1.0	1.3	1.7	2.7	2.7	2.7	2.4	2.2	2.0

Source: EBRD staff ratings. See EBRD Transition Report for details.

Principles of large privatization is similar, the managers of firms, which selected for large privatization are obliged to make a so-called basic privatization proposal. The appreciation of different privatization proposals done by branch of ministries who make comments, then by the ministry of privatization and the final decision taken by the government. Methods applied to large privatization are public tenders, direct sales, sales

through intimidators (banks), transfers to municipalities and voucher privatization, as shown in table 6, All these by law on the same level of importance. There is no boundary between the property selected for large and small-scale privatization, there are some firms sold for more than 100 mil CZK in small privatization, and firms with in a value of 5 mil CZK accepted for large-scale privatization, lastoviska (1993).

**Table 6: Progress of large scale privatization in 1992-1993\***

Privatization method: value of property	1992		1993	
	June	December	June	December
<b>Public Auction</b>	2,182,650	3,363,881	4,315,634	5,145,811
<b>Public Tender</b>	1,475,953	30,010,436	42,416,434	50,219,188
<b>Direct Sale</b>	52,414,077	98,626,613	135,938,016	242,262,288
<b>Privatization Joint Stock Copmany</b>	1,120,380,001	1,218,420,171	1,327,534,779	1,777,754,263
<b>Unpaid Transfer</b>	7,867,395	10,529,633	135,212,772	231,830,013
<b>Total</b>	1,184,320,076	1,360,950,734	3,006,368,369	2,307,211,563

Source: Ministry for Privatization in Czech Republic

\*Former federal property not included.

Vouchers used to privatize substantial portions of the economy in several transition countries in Central and Eastern Europe. The core of these voucher schemes was the use of artificial money (vouchers) to purchase shares of privatized companies in several waves of closed auctions, Woo, Parker and Sachs (1997). The method of giving away state assets to citizens is to issue coupons to all citizens over the age 18, but runs the risk that most coupon holders would sell them immediately in the secondary markets for cash. The market prices of coupons would then collapse to a small fraction of their true value. Local capitalists and foreigners then buy most of the assets at very low prices. Hanousek and Kroch (1998) stated that, voucher privatization took place in Czech Republic in two waves. The first wave involved shares in 988 firms. The second included shares in an additional 676 firms plus unsold shares in 185 firms carried over from the first wave. Each wave involved several rounds of bidding. To prevent strategic endgame behavior, the exact number of rounds was not announced until just prior to the

final round (round 5 in the first wave and round 6 in the second wave). Share prices announced by the administrative authorities and participants submitted bids for the number of shares desired at the announced price.

All Czech citizens over the age of 18 were eligible to acquire 1000 voucher points; each unit of demand is 1 coupon that equals 100 points. The money value of 100 points is 100 Czech crowns (CZK). Approximately 75 percent of eligible Czechs participated in each wave, making the book value of the shares available slightly more than \$1,400 per participant in the first wave and \$1,000 in the second wave. The total book value of the equity privatized through vouchers was more than \$14 billion, about 10 percent of the Czech Republic's national wealth, Hristova (2002).

## ***2.2 Transition and Structural Reforms***

After the collapse of communist system, the overall strategy of transition and reform policies appear and influenced by economic and institutional constraints and the long-term political and economic aims of the reforms, rather than by the usual short-term concern to gain and preserve political power. Most of these constraints are systematic and common to all countries undergoing the transition. In addition, economic, institutional and political reforms have a feedback effect on the constraints. These economic and political reforms have positive outcomes, which tend to decrease some of these constraints, and discuss the effect of negative outcomes, such as severe recessions and fiscal problems, which tend to produce new economic and political systems.

### **2.2.1 Economic and Political Support for Reforms**

During transition, a change of economic system requires major structural shifts in terms of institutions, ownership, modes of interpersonal behavior, attitudes to work, and laws. Some institutions have to be closed or cut in size which is not going with this transition process, at the same time new institutions have to be created (stock exchange, securities commission, investment and pension funds, unemployment office, foreign exchange dealers), all these with new political parties. Moreover, other institutions have to be expanded (banks, business schools, customs and other tax offices, business consulting). These institutional changes superimposed on large changes in the pattern of price and foreign trade relations, which imply major shifts in the requirement of increasing outputs. Reforms in transitions are revolutionary and bring large changes in the economic and social circumstances and opportunities of individuals and businesses. The



changes for the better are large enough to sustain broad public support for the reform process, as the high popularity ratings of many of the new political leaders showed. In contrast, there are also large costs that influence the political process as well, Gomulka (1994).

The transition economies implemented, economic and political liberalization simultaneously (in many post-communist countries, political reforms in fact proceeded faster than the economic ones). This simultaneous reform may have affected their economic performance in several ways. First, democracy brings about political constraints that may slow down progress in economic liberalization (for example, through voters' opposition to reform implementation or their support for reform reversal) and, in turn, harm economic performance during transition. Second, democracy increases uncertainty, as future governments may not necessarily continue policies and honor commitments introduced by the previous government. On the other hand, democracy ensures that property rights are guaranteed and is therefore a necessary precondition for sustained long-term growth, Roland, (1999). De Melo (1996) stated that, democracy is seemingly associated with higher growth during transition. Table 3 reports values of a democracy index based on the Freedom House indices of political rights and civil liberties. Countries that introduced wide-ranging democracy generally report higher growth. For instance, in the Czech Republic the liberalization index was 0.68 in years 1990/93 and 0.83 in years 1994/98 that is why there is improvement in economic growth during these two periods to be positive by 2.28 percent. This pattern is unlikely to be due to reverse causality (faster growing countries being able to introduce greater democracy) because democratization largely preceded resumption of growth in post-communist countries.

**Table 7: Countries in Transition: Indicators of Economic Growth, Liberalization and Democracy**

Countries	Avg. Growth 1990-93	Avg. Growth 1994-98	Liberal. Index 1990-93	Liberal. Index 1994-98	Democr. Index 1990-93	Democr. Index 1994-98
Albania	-8.83	5.68	0.40	0.63	0.479	0.517
Armenia	-7.06	-22.98	0.25	0.57	0.479	0.483
Azerbaijan	-14.53	-2.80	0.16	0.45	0.313	0.250
Belarus	-5.35	-0.10	0.17	0.41	0.479	0.250
Bulgaria	-7.40	-1.94	0.58	0.63	0.729	0.783
Croatia	-12.35	5.50	0.69	0.75	0.500	0.500
Czech Rep.	-3.65	2.28	0.68	0.83	0.854	0.917
Estonia	-11.23	4.16	0.49	0.80	0.646	0.867
Georgia	-25.80	3.08	0.23	0.55	0.354	0.483
Hungary	-4.78	3.08	0.73	0.84	0.854	0.917
Kazakhstan	-6.38	-4.16	0.22	0.58	0.375	0.250
Kyrgyzstan	-9.25	-1.32	0.25	0.70	0.500	0.483
Latvia	-14.33	3.06	0.40	0.72	0.625	0.850
Lithuania	-12.05	2.30	0.45	0.74	0.688	0.900
Macedonia	-13.05	0.86	0.68	0.67	0.563	0.600
Moldova	-12.33	-9.90	0.26	0.62	0.375	0.567
Poland	-3.05	6.00	0.76	0.81	0.833	0.900
Romania	-6.45	0.18	0.40	0.65	0.396	0.717
Russia	-7.80	-4.82	0.31	0.67	0.563	0.567
Slovakia	-6.83	5.86	0.66	0.79	0.771	0.733
Slovenia	-4.08	4.28	0.73	0.79	0.729	0.917
Tajikistan	-12.18	-5.76	0.15	0.41	0.313	0.067
Turkmenistan	-4.50	-11.38	0.09	0.31	0.188	0.000
Ukraine	-10.63	-10.02	0.13	0.52	0.563	0.58
Uzbekistan	-3.08	0.44	0.16	0.54	0.208	0.050
<b>Average</b>	<b>-4.31</b>	<b>0.01</b>	<b>0.401</b>	<b>0.640</b>	<b>0.535</b>	<b>0.566</b>

Sources: EBRD Transition Report (various issues), de Melo (1996, 1997), Freedom House, World Bank Development Report 1996.

Notes: Liberalization Index is unweighted mean of the indices constructed by de Melo et al., as extended by Havrylyshyn. (1998). The index ranges between zero (no liberalization) and one (complete liberalization). Democracy Index is average of political rights and civil liberties (reported by the Freedom House), respectively, ranging between zero (no democracy) and one (complete democracy).

### **2.2.2 Reform Characteristics in transition countries**

According to Borensztein (1993), there are three fundamental facts that characterize transition economies in the early years of liberalization: a fall in output, a sudden sharp

rise in inflation and a depreciation of the real exchange rate followed by a slower, steady appreciation. Table 4 shows these fundamental facts for a number of Central and Eastern European transition economies in the early 1990s. The fall in output attributed to negative supply shocks a credit crunch (Calvo and Coricelli, 1992). Furthermore, high real interest rates were imposed on enterprises, which responded by reducing their demand for credit and production levels; a statistical exaggeration due to under-reporting of the activity of the private sector; and the limited mobility of resources, (Berg and Sachs, 1992). The rise in inflation usually attributed to the early liberalization of goods market prices, which rise in line with world prices following administered repression, but where output is slow to respond to the price signals, due to the slowness of the privatization process and the lack of market-oriented institutions. For instance, according to the EBRD (1999), of their sample of 13 transition economies, there were only two countries not liberalized the majority of goods market prices by 1992 (Romania and Ukraine), whereas only five countries liberalized their financial sectors by 1995 (Czech Republic, Hungary, Poland, Slovakia and Slovenia).

**Table 8: Annual inflation rate, output growth and real exchange rate changes in selected transition economies 1990–1995, % per year**

Country	1990	1991	1992	1993	1994	1995	1996
<b>Albania</b>							
<b>Inflation</b>		104	237	31	16	6	20
<b>Growth</b>	-10	-28	-10	11	9	9	5
<b>Competitiveness<sup>1</sup></b>				-24.6	-22.4	-6.6	2.9
<b>Bulgaria</b>							
<b>Inflation</b>		339	79	64	122	33	165
<b>Growth</b>	-9	-12	-7	-2	2	3	-4
<b>Competitiveness</b>				53.7	-8.9	12.3	-14.2
<b>Czech Republic</b>							
<b>Inflation</b>		52	13	18	10	8	9
<b>Growth</b>	0	-14	-6	-1	3	5	5
<b>Competitiveness</b>		-7.6	4.6	16.3	5.1	3.4	6.7
<b>Hungary</b>							
<b>Inflation</b>		32	22	21	21	28	22
<b>Growth</b>	-4	-12	-3	-1	3	2	2
<b>Competitiveness</b>	3.7	10.4	8.8	8.8	-1	-4	2.8
<b>Poland</b>							
<b>Inflation</b>		60	44	38	29	22	19
<b>Growth</b>	-12	-7	3	4	5	7	5
<b>Competitiveness</b>	-15.9	56.5	6.4	7.3	1	8.2	8.8
<b>Romania</b>							
<b>Inflation</b>		223	199	296	62	28	60
<b>Growth</b>	-6	-13	-9	1	4	7	5
<b>Competitiveness</b>	-32.5	-6.9	-38.2	38.7	7.5	-2.2	-9.6
<b>Slovakia</b>							
<b>Inflation</b>		58	9	28	12	7	6
<b>Growth</b>	-3	-15	-7	-4	5	7	6
<b>Competitiveness</b>		-3	1.7	5.5	1	2.8	-0.3
<b>Slovenia</b>							
<b>Inflation</b>		247	93	23	18	9	10
<b>Growth</b>	-5	-8	-5	1	5	4	3
<b>Competitiveness</b>				8.8	-2.6	-16	7.1

Sources: Inflation is end of year rate, from the EBRD Transition Report, 1999. Growth is the growth of real output, from the EBRD Transition Report, 1999. Competitiveness is from International Financial Statistics, Annual Yearbook, 2001, real effective exchange rate.

The depreciation and subsequent appreciation of the real exchange rate during transition explained by Halpern and Wyplosz (1997), in the way that initial inflation shock followed by a gradual rise in productivity. This pattern is less clear from Table 8, partly because of the currency changes, which make consistent data difficult to obtain in the initial transition phase, but also due to sharp changes in exchange rate policy<sup>2</sup> and the

<sup>1</sup> Competitiveness is calculated from International Financial Statistics, Annual Yearbook, 2001, using the ratio of the US consumer price index multiplied by the average local dollar exchange rate to the local CPI, where no series is recorded for the real effective exchange rate

<sup>2</sup> The principal transition economies initially operating a flexible exchange rate policy included: Bulgaria, Lithuania, Moldova, Romania, Russia, Slovakia, Slovenia, Ukraine, with Hungary and Poland having

different speeds of transition such as the Czech Republic, Poland, Romania and Slovakia.

Majority of the authors found that structural reforms in transition have a significant positive impact on economic growth. DeMelo (2001) find a nonlinear effect over time with reforms initially causing a decline in growth rates, presumably due to adjustment costs, but this decrease is less than a positive effect in the year after the reforms that introduced. Berg (1999) challenges this conclusion and provides evidence of a nonlinear effect of reforms across sectors of the economy. These authors show that a smaller negative impact on state sector performance offset by a much larger positive impact on private sector growth. They argued about the positive impact of reforms and once initial differences in reform levels controlled for subsequent reform efforts called the speed of reform; have no significant additional impact on average growth.

### **2.2.3 Reforms in Czech Republic**

The importance of the reforms from central plan to free market has been redesigning the role of the state in the Czech Republic. After 1989, state authorities regulated not only the economy, but also most of the activities in the society. It was clear that at the beginning of transition the scope of the state's activities needed to be heavily reduced but in the same time to promote its efficiency in providing standard public services. On the one hand, the direct state role in the economy, trade and exchange regime control, and direct control of enterprises and banks was supposed to be decreased. On the other hand, the state could not give up its rules setting and enforcement roles for private enterprises to ensure the citizens' access to public goods and services.

Hanousek, Kocenda, and Lizal, (2004) stated that The Czech Republic government liberalized almost all the prices, privatized most of the economy, decentralized the wage setting, and opened the country to the foreign trade with nearly balanced budget. Furthermore, they pointed out that starting with the privatization process unemployment rate was below 4% till 1995, low inflation, and GDP per capita level of over 5000 USD and remains high in comparison with other transition countries. By 1995, the past recession and the negative impact of the split of Czechoslovakia had finished and the economic growth started with 6% in 1996 and continuing this robust growth of 5%, but in 1997 it was becoming clear that the macroeconomic success was not because of the

---

crawling pegs. However, the Czech Republic switched from a pegged rate to a managed float in 1997, Bulgaria switched to a currency board in the same year and Poland moved to a flexible rate in 2000.

good performance of microeconomic foundations. The growth of wages more than productivity led to a higher demand of durable goods imported by consumers and increasing foreign trade and current account deficits, this deficits solved by inflowing foreign capital attracted by high interest rates .

Finally, in 2000 the economy started to grow up both by inflowing of FDIs and investments by domestic firms. Moreover, private consumption as well depending of the growth of real wages reaches 4% during 2001. The only macroeconomic variable that shows the performance of the Czech economy it was net exports, and overall, GDP growth stood at over 3% in 2000 and 2001. When the economy started to grow in 2000 the budget deficit doubled again because it is obvious that not all of the increases attributed to the economic growth, for example, higher prices of oil and other raw materials were significant to increase imports. Further, foreign investors imported most of the needs of technology when they are investing in the country. Finally, the economic slowdown of EU also limited the growth of exports, because the major part of Czech exports it is with EU countries, Hanousek, Kocenda, and Lizal, (2004).

### ***2.3 Transition Impact on Economic Performance***

The policymakers in Czech Republic formulated transition strategies that focused on macroeconomic stabilization and microeconomic restructuring, along with institutional and political reforms. The implementation of these strategies was different across countries in speed and significance, but almost all the transition countries plunged ahead in rapid style of transformation of economy. The transition countries have not performed as many had expected, and economic performance varied across countries, but at least central European countries performed better than the Baltic States, and Baltic stated performed better than Russia and Ukraine. Here we are interested on focusing the macroeconomic performance in Czech Republic after the transition process, Jan Svejnar, (2002).

#### **2.3.1 GDP growth**

During the last several years, GDP in the Czech Republic has been very satisfactory and this trend looks likely to continue in the future. This indicator shows domestic production including the service sector, general consumption, and public expenses. The entry of a large investor or a willingness on the part of consumers to spend is positive economic performance. By illustrating table 9 below, we can see between 1996 and

2006 the Czech economy as a whole underwent some significant structural changes. Generally, the GDP increased all of the years except year 1998. This phenomenon occurred, with varying degrees of intensity it was in all regions of the country. One of the important economic indicators used to gauge a given country's economic performance is GDP growth, especially in year 2006.

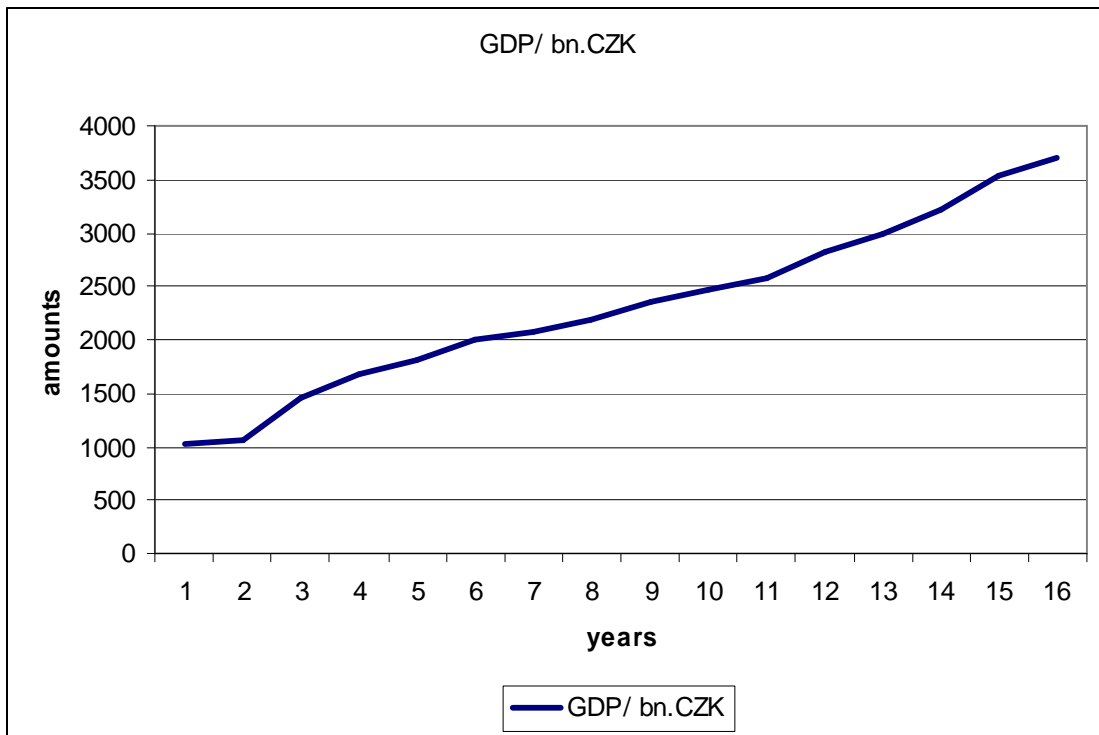
**Table 9: Macroeconomic indicator's after transition in the Czech Republic**

Years	GDP growth % base year=1999	Inflation rate %	Nominal exchange rate CZK/EUR	Unemployment rate %	FDI CZK/M	Real wage <sup>3</sup>	Exports Real term % y/y <sup>4</sup>	Imports Real term % y/y
1996	102.7	8.8	34.45	1.1	38,775	108.7	5.5	12.1
1997	100.4	8.5	35.80	1.3	41,251	102.3	8.4	6.9
1998	95.5	10.7	36.16	1.9	119,965	98.6	10.4	8.3
1999	100.0	2.1	36.88	3.1	218,812	106.2	5.4	4.9
2000	103.2	3.9	35.61	4.1	192,421	102.4	16.5	16.3
2001	101.2	4.7	34.08	4.2	214,585	103.8	11.2	12.8
2002	102.3	1.8	30.81	3.7	277,689	105.4	2.1	5.0
2003	103.3	0.1	31.84	3.8	59,316	106.5	7.2	8.0
2004	103.0	2.8	31.90	4.2	127,844	103.7	20.7	17.9
2005	104.0	1.9	29.7	4.2	279,181	103.3	11.8	5.0
2006	108.8	2.5	29.2	3.9	135,948	103.8	14.4	13.8

Sources: CZSO, CNB

<sup>3</sup> Index corresponding of base year 1993=100

<sup>4</sup> y/y = year-by-year chang



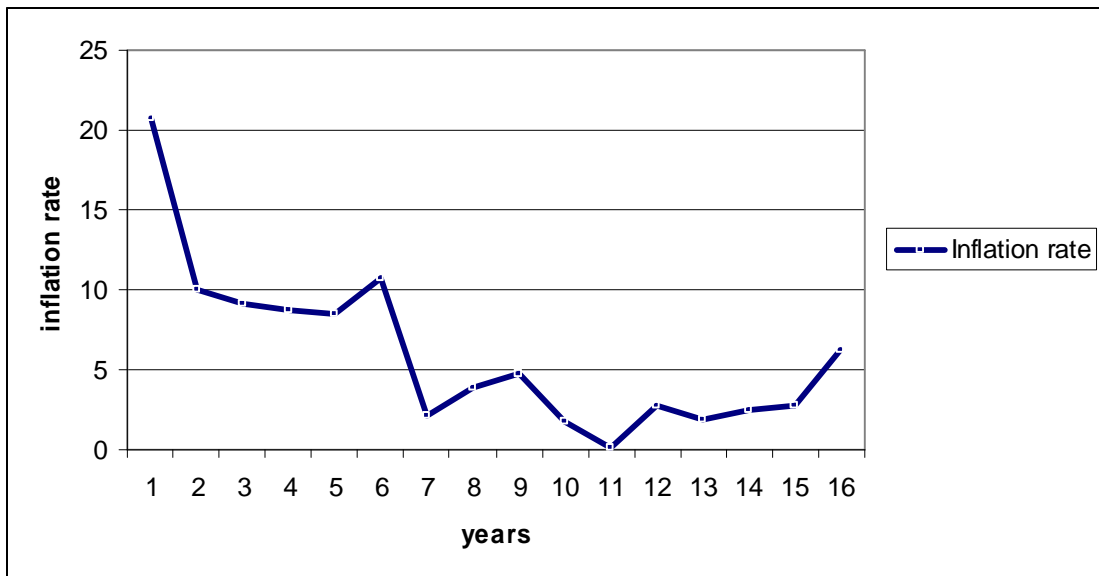
**Figure 2.1: Czech GDP from 1993 to 2008/ bn.CZK**

Source: Author's own construction of the figure depending on table 19

### **2.3.2 Inflation rate**

Many of the transition countries experienced high inflation rate as the communist system disintegrated. For example; Slovenia, Poland, Albania, Bulgaria and Romania experienced at least one year high inflation from 1990 to 1993 when consumer price inflation exceeded 200 percent; Estonia, Latvia, and Lithuania all had one year with inflation around 1000 percent; Russia Ukraine and Kazakhstan experienced at least one year with inflation above 2000 percent. Furthermore, these rates of inflation rose after lifting price controls; in other cases, the inflation rate grew in financial sector crises. In the end of 1990s, reforms in economy show that these countries could reduce inflation rates speedily and effectively, Svejnar, (2002).





**Figure 2.2: Czech Inflation Rate from 1993 to 2008**

Source: Author's own construction of the figure depending on table 19

Table 10 shows selected group of transition countries, which experienced inflation rates. The first group of countries is in central Europe, the second set represents the northern part of Eastern Europe (Baltic countries), the third set represents the southern part of Europe (Balkan countries), the fourth set represents Russia and other countries in the Commonwealth of Independent States; and final set offers some comparisons from the western European economies and United States. In 2001, inflation rates in many transition countries were in single digit except Romania, Russia and Ukraine. For example, Romania, Russia and Ukraine had inflation rates in the range of 9 to 35 percent by 2001. Moreover, this outcome is important because yearly inflation of 35 percent or less does not seem to have negative impact on economic growth and consumer welfare, Fischer, Sahay and Vegh, (1996).

**Table 10: Current Macroeconomic Indicators in the Selected Group of Transition Countries**

Countries	Consumer price inflation (%) 2001	Current account balance (% of GDP) 2001	External Debt(% of GDP) 2000	Government Budget Balance (% of GDP) 2001	Private Sector Share (% of GDP) 2000	Unemployment (%) 2000
<b>Central Europe</b>						
Czech Republic	4.6	-5.1	46.5	-9.2	80	8.9
Hungary	9.4	-5.4	67.8	-3.5	80	6.5
Poland	6.6	-6.0	42.8	-3.0	70	16.1
Slovak Republic	7.1	-8.8	53.5	-4.0	75	18.6
<b>Baltic Countries</b>						
Slovenia	7.7	-3.0	33.4	-1.0	55	7.0
Estonia	6.2	-7.7	63.0	-0.5	75	13.7
Latvia	3.3	-7.1	66.2	-2.0	65	14.3
Lithuania	2.0	-6.4	43.8	-1.4	70	16.1
<b>Balkan Countries</b>						
Albania	4.0	-6.8		-9.2	75	17.1
Bulgaria	8.0	-5.2		-1.5	70	16.2
Romania	35.0	-3.9		-4.0	60	7.2
<b>Commonwealth of Independent States</b>						
Kazakhstan	8.7	2.0	67.6	-1.5	60	6.3
Russia	22.4	10.2	62.0	0.0	70	10.0
Ukraine	16	1.4	33.2	-3.0	60	4.2
<b>Comparison Economies</b>						
European Union	1.8	-0.4	Na	-0.2	Na	8.2
United States	2.6	-4.2	Na	1.5	Na	4.0

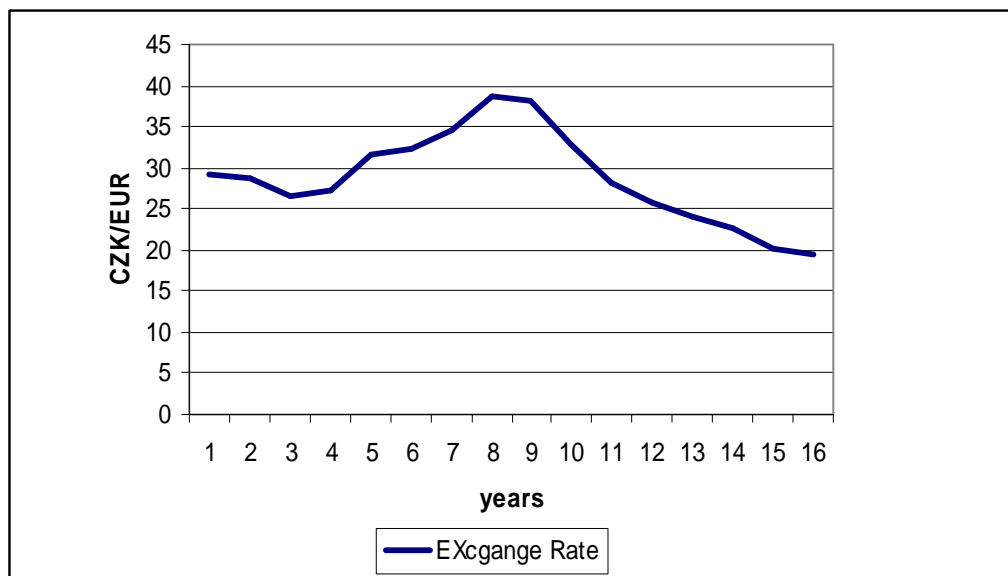
Sources: Data in the first five columns are from: William Davidson Institute based on EBRD transition Report, various issues; IMF World Economic Outlook, May 2001; OECD Economic Outlook, July 2001; World Bank Indicators 2001; and EIU-DataStream. Data for column six is from William Davidson Institute, based on ILO (2000), World Bank (2001), EBRD various issues, and OECD (2001), and based on labor survey. Russian data from Sabirianova and Earle (2001) using LFS figures, reported in Goskomstat (2000), Goskomstat (1999) and OECD (2000).Kazakhstan value for 1999. The data are generally annual averages of monthly, quarterly, or semiannual data. For full source information, see (<http://www.wdi.bus.umich.edu>).

The Czech National Bank is convinced that credible monetary policy effectively influences inflation expectations and minimizes the costs of maintaining price stability. Furthermore, most of the economic variables which showed in table 9 are related to each other, and affecting each other in the same time. For example, in years 1996, 97, 98 GDP growth was not so high that is why inflation rate was high, or in these years unemployment rate was low that is why inflation rate was high which is coincide with Philip's curve in the economic theory. In general, the rate of inflation slowed down from 8.8 in 1996 to 2.5 year 2006.

### 2.3.3 Exchange rate

Many transition countries devalued their currency as means of export protection and adopted a fixed exchange rate as part of macroeconomic stabilization. They also renewed their foreign trade away from the old council for mutual economic Assistance arrangements and toward market economies. However, as domestic inflation rate exceeded world inflation rate in the 1990s, the fixed exchange rate became invaluable, leading in some countries to substantial current account deficits. For example, Russia, Kazakhstan, Albania and Bulgaria all had at least one year current account deficits 10 percent of GDP or greater between 1990 and 1993. Most transition economies responded by devaluing their currencies again and adopting more flexible exchange rate regimes, although Bulgaria, Estonia and Lithuania have fixed their exchange rate through currency boards as a means of long-term economic stabilization, Svejnar, (2002).

The second column of table 6 shows that central and eastern Europe had current account deficits of moderate size, which expected for countries that are seeking to attract a new inflow of foreign investment. Although, Russia and other economies of Commonwealth of Independent States are often significant exporters of natural resources, and are experiencing a net outflow of investment funds, as shown by their current account surplus.



**Figure 2.3: Czech Exchange Rate between CZK/EUR from 1993 to 2008**

Source: Author's own construction of the figur depending on table 19

The stability of the exchange rate and a type of its regime are important elements in the overall monetary policy of each country. The significance of the matter even more accentuated in the case of transition economies because international lending institutions like the International Monetary Fund, the World Bank, and the European Bank for Reconstruction and Development provide credit subject to macroeconomic stability and a stable exchange rate. This is true no matter what kind of regime adopted. A certain reduction in the relative volatility of exchange rates was desirable in order to promote exports, FDI, and generally favorable economic development during the transition to a free market economy in Czech Republic. Exchange rate volatility associated with the floating exchange rate regime after 1999 did not pose any potential threat to the growth of international trade and macroeconomic stability, partly because hedging facilities would protect one against risk. Table 8 shows the appreciation of Czech currency in comparison with Euro even with the USD, and it is even not threaten the foreign trade as well. That means increasing in the foreign trade and increasing the purchasing power for the domestic consumers as well.

#### **2.3.4 Unemployment rate**

The problem of unemployment known before the process of transition in many countries, but it emerges rapidly in central and eastern European countries, except for the Czech Republic. After two years of transition, the unemployment rate rose into double digits in most economies of central and Eastern Europe. For instance, in 1993 the unemployment rate reached 16 percent in Bulgaria and Poland, 12 percent in Hungary and Slovakia, 10 percent in Romania, 9 percent in Slovenia, but only 3.5 percent in the Czech Republic. The high unemployment rate explains high rates of inflow into unemployment as firms laid off workers and relatively low outflow rates from unemployment as the unemployed found it hard to find new jobs. The Czech Republic labor market was a successful model of transition labor market, characterized by high inflows as well as outflows, with unemployment representing a transition state between old and new jobs, (Ham, Svejnar and Terrell, 1998, 1999; Svejnar, 1999; Boeri, 2000). Unemployment rate rose more slowly in the Commonwealth of Independent States and the Baltic countries as firms were slower to lay off workers and used wage declines and arrears as devices to hold on to workers. For example, in 1993 unemployment rate in Russia and Estonia was near 6 percent.



**Figure 2.4: Czech Unemployment Rate from 1993 to 2008**

Source: Author's own construction of the figure depending on table 19

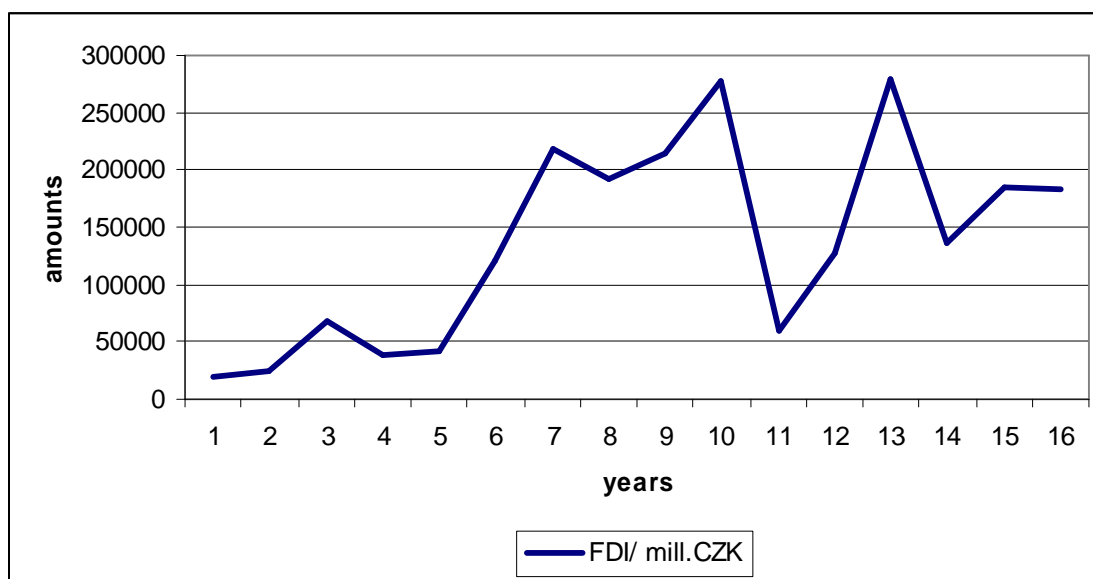
Most of the researchers believed that transition to free market will be accompanied with a recession caused by both the restrictive macroeconomic policies and by the restructuring of the economy required by the shift from socialism to the market economy. Further, newly privatized domestic firms are not able to gain access to foreign markets, skills, and necessary financing for their economic success, which means increasing unemployment rate. Another negative threat for employment may be coming from the resource reallocation associated with enterprise restructuring suggested by the microeconomic perspective. This may occur if privatization leads to decrease employment rate as managers freed from political interference and return to profit maximization as their principal objective discussed before. Table 9 shows even GDP still growing up and the rate of unemployment is becoming high in comparison with the beginning of transition or in comparison with year 1996 which was just 1.1%, but in 2006 it was 3.9%.

### **2.3.5 Foreign direct investment**

In the countries like East Asian Tigers were known for high rates of investment especially foreign investment, often exceeding 30 percent of GDP, these investment rates slowed down to about 30 percent in the 1980s in a number of countries as governments yielded to public pressure for more consumer goods. The investment rates decreased further to about 20 percent of GDP in the 1990s in a number of transition

countries (EBRD, 1996), although countries such as the Czech Republic and Slovak Republics maintained relatively high levels of investment. Unfortunately, much of this investment appears to have been allocated in efficiently by the monopoly banking system through the 1980s and by the inexperienced and often politicized or the corruption of commercial banks in the 1990s, Lizal and Svejnar, (2002). Actually, trends in foreign direct investment (FDI) may provide a better measure of the attractiveness of investment in the transition economies than domestic investment figures.

Hungary was the only transition economy receiving a significant flow of FDI until 1997. Analysts usually attribute this success to the fact that Hungary more opened to FDI and well-defined rules and regulations for FDI since the early 1980s. Starting in 1988, major foreign direct investment went to the Czech Republic, Poland and Slovakia. However, many countries of Eastern Europe remain, along with Russia, rather unattractive to foreign direct investment. The rate of FDI appears to increase with several factors; the perceived date of accession of a given country to the European Union Area; the desirability of countries political, economic and legal environment; and the availability of attractive privatization projects in the country, Lizal and Svejnar, (2002).



**Figure 2.5: Czech Inflow of Foreign Direct Investment from 1993 to 2008**

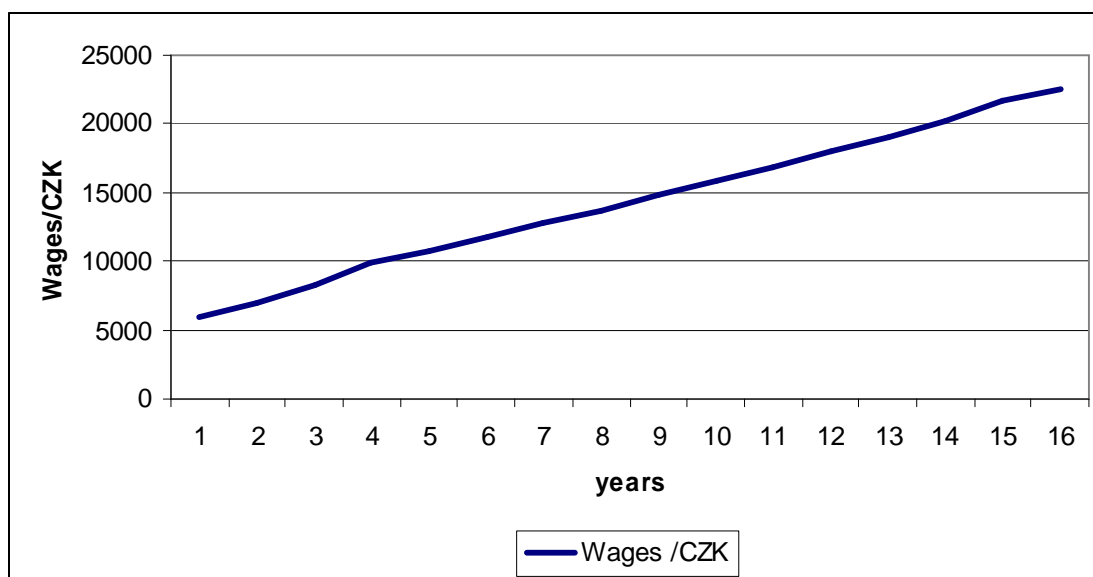
Source: Author's own construction of the figure depending on table 19

In the Czech Republic, on average during 1996–2006, the FDI inflow was 6.5% of GDP annually, but there were big differences among years caused by large privatization

deals. The growth of FDI flows accelerated only in 1995 and continued to increase thanks to the privatization of three big banks between 1998 and 2002. On the other hand, 2003 and 2004 saw no major large-scale investment projects and the increase in the stocks of FDI was lower. According to Katuscak and Zemcik (2007) the structure of FDI dominated by manufacturing with its share reaching 38% on total stock. In the end of 2006, FDI has been playing an important role in manufacturing and foreign owned manufacturing firms estimated to produce 65% of total sales, providing employment for 45% of the labor force, and produce about 80% of total exports. Finally, they found out that FDI is an important component of transformation in the Czech economy and helps to facilitate rapid change. Table 9 shows the positive relation between FDI and GDP growth as well as the growth of export rate in the same time.

### **2.3.6 Wages**

Most of the transition economies state-owned enterprises rapidly decreased employment and real wages in early 1990s, Svejnar (1999). In Central Europe, the great reduction in industrial employment occurred in Hungary over 20 percent, followed by Slovakia over 13 percent, Poland over 10 percent, and the Czech Republic 9 percent. The downward adjustment in industrial wages proceeded in reverse order amounted to 24 percent in the Czech Republic, 21 percent in Slovakia and 1 percent in Poland. Moreover, Hungarian real wages in industry actually rose by 17 percent. In Russia and the rest of Commonwealth Independent States, the adjustment brought a mixture of wage and employment adjustment, Desai and Idson, (2000), and the wage decline more pronounced than in Central and Eastern Europe. According to Basu, Estrin and Svejnar (1997,2000), labor demand elasticity's with respect to output and wages were significant in the more market-oriented transition economies, and they rose rapidly in Central Europe as transition was lunched.



**Figure 2.6: Czech labour Wages in CZK from 1993 to 2008**

Source: Author's own construction of the figure depending on table 19

Table 9 shows that wages not growing too much in tandem with the growth of GDP or the growth of export rate. According to Czech Statistical Office, the slow down of the real wage growth coming from the appreciation of Czech crown, and Internationally owned companies pay the highest average salaries over the long term (CZK 23,814 (€338)), while cooperative enterprises pay the lowest salaries (CZK 12,658 (€146) on average). Furthermore, the sectors contributing the most to the growing employment and wages in recent years have been manufacturing and private services. While real wage growth does not seem to put much pressure on inflation, it related to the continuous slight drops in employment. In addition, the growth of real wages maybe affecting the economy in two different ways; firstly, the growth of real wage it is coming from the increase in productivity, which is leading to the increase in exports of goods, produced domestically. Secondly, the growth of real wages helps domestic consumer to increase their purchasing power and their demand for durable imported goods, which led in the end to the growth of foreign trade.

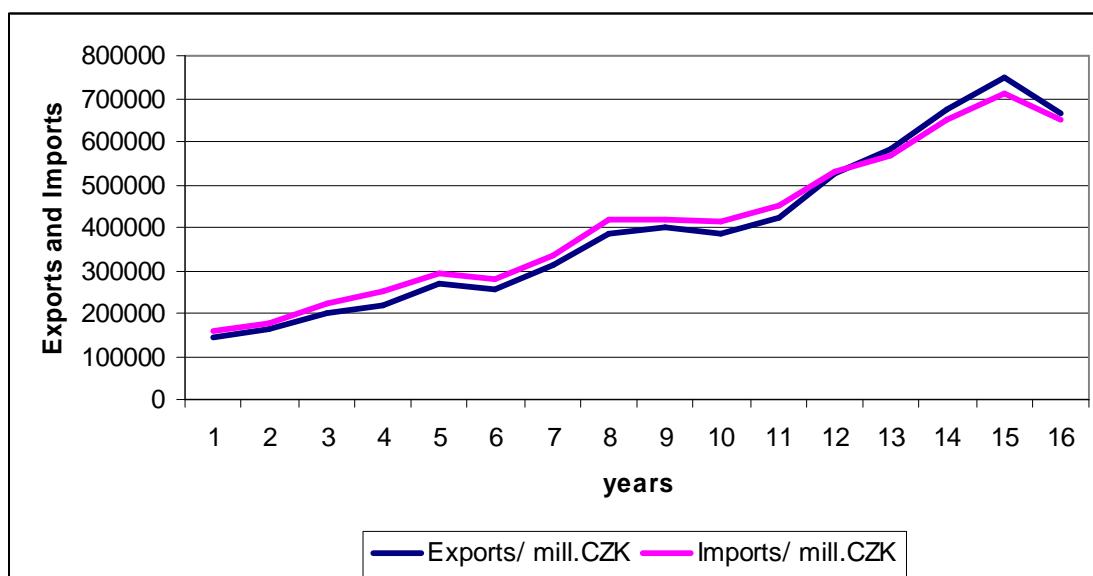
### **2.3.7 Exports and Imports**

The evolution of exports and imports has two basic components: the common macroeconomic background (GDP at home and the real exchange rate) and industry-specific technology, factor supply, market structure and barriers to trade. The analysis addresses both the macroeconomic and the microeconomic factors of growth and



quantifies their general impact on industries or even enterprises. While the macroeconomic variables assumed main drivers of overall trade growth, the microeconomic variables are associated with structural developments Vladimír, Jiří, and Ladislav, (2005).

The theory of international trade predicts that trade specialization and division of labor increase as countries in different levels of development remove trade barriers and intensify economic relationships between each other. In the case of the Czech Republic, opening and liberalization of the Czech economy lead up to new specialization patterns according to comparative advantages relative to the new trade policy. Moreover, Czech exports rely mainly on sales of standardized goods where the price is the most dominant criterion of choice. The Czech Producers would therefore force their production to the relative factor proportions of the economy, employing the most productive people and cheapest production factors. The most advanced Czech industries embark upon a process of catching up advanced technological market economies, and they will be likely increasingly to conduct intra-industry rather than inter-industry trade, Bohata and Ficher, (1995).



**Figure 2.7: Czech Total Exports and Imports from 1993 to 2008/ Mill. CZK**

Source: Author's own construction of the figure depending on table 19

One of the most important issues in the Czech economies has been the liberalization of foreign trade and reduction of tariffs and non-tariff barriers. The state monopoly of foreign trade eliminated at the beginning of reforms, and fixed exchange controls replaced by free convertibility of the Czech crown for current transactions. The rapid

shift from transferable fixed exchange rate trade to trade based on freely convertible currencies brought about a drastic reduction of trade among the Central and East European countries (CEECs) and increasing economic exchange between the Czech Republic and west European countries, Aiginger, Peneder and Stankovsky, (1994).

In the Czech republic foreign trade have boosted both exports and imports during 1996 to 2006. On the supply-side characteristics, FDI, domestic GDP, domestic production prices, changes in endowments of physical and human capital and growing competitiveness of domestic production played an important rule in the growth of exports. In the demand side, appreciation of the real exchange rate has significantly opened the Czech market to imports but the unconstrained import penetration remained blocked by the growing competitiveness of Czech products in costs, prices and quality. Furthermore, the growth of real wages led to increase in the domestic demand of imports.

### **3 The Evolution of Foreign Trade in Czech Republic**

#### ***3.1 Adjustment of Foreign Trade Flows during the Transition Period***

##### **3.1.1 Theory of trade**

Most of economists accepted traditional theoretical trade approaches, like the Heckscher-Ohlin theory or the Ricardo model, may describe (inter-industrial trade)<sup>5</sup> among countries at different levels of economic development. The Heckscher-Ohlin theory suggests that the trade composition of countries depends on the relative factor endowment, and on the relative price. In a simplest version of two goods, two countries and two factors, as well as certain restrictive assumptions (perfect competition, identical production function or identical production technologies respectively, constant return to scale, homogenous goods identical preferences of consumers). The model predicts that each country will export the goods, which embodies large amounts of its relatively abundant and therefore relatively cheap production factor. Ricardian theory specify when the technology is different between two countries, each country will specialize in the production of that commodity for which it possesses a comparative advantage and higher productive advantage or smaller relative productivity deficits, Frank, (1997).

Modern trade theories have to specify by the deviations of the assumptions of standardized goods, perfect competition and constant returns to scale. According to

---

<sup>5</sup> trade between countries in goods from different industries

these theories, emerging patterns of trade may be because of specialization in production of heterogeneous goods and dynamic economies of scale. The cheap prices even more not the only criterion of choice for trade between two countries. Companies producing differentiated goods compete by firm-specific property advantages, for instance, marketing, design and additional services. Therefore, industries at a similar level of technological development are likely to conduct intra-industry trade<sup>6</sup>, by using their firm specific advantages plus increasing returns to scale in certain segments of expanding market. The case of the Czech Republic trade could not be explained by relative factor endowments and therefore by price deviations of standardized goods alone. Moreover, the trade performance of industries by factor intensities alone is not acceptable. Therefore, because of the technological gap between the Czech economy and the EU, it is preferable that inter-trade specialization will be the most dominant characteristic of changing trade patterns after the liberalization of trade. In the first step of increasing competition, Czech firms have to rely on cost advantages, making use of relatively abundant and therefore cheap factors. Later of the inter-industry trade specialization would be followed by second step in which technological catching-up and increasing intra-industry trade become the most dominant pattern, Bowen, Leamer and Sveikauskas, (1987).

### **3.1.2 Foreign Trade during the Transition Period**

Most of the transition economies faced a huge supply of labor but a shortage of capital, although some OECD publications suggest that capital was not generally scarce, for example, in the case of Czech Republic the ratio of capital investment to GNP was very high, particularly for heavy industries defense-related sectors. However, having the central administration of economic activities, including foreign trade, and control of prices, real factor proportions were not fully reflected in the structure of production. Thus, we cannot expect that Czech exports and imports were significantly determined by natural labor or by capital endowments. The important factor of trade seems to be the fact that relative factor abundance changed radically through economic transition. The regulation of prices, a subsequent increase of capital costs and a continuous decrease of real wages, one would expect to become exports more labor-intensive and imports more capital-intensive. In the beginning of the transition process, the technology gap

---

<sup>6</sup> refers to the exchange of products belonging to the same industry. The term is usually applied to international trade, where the same kinds of goods and services are both imported and exported.

between transition countries and west European countries was wide and the labor force was used inefficiently. After the implementation of economic reforms and the organizational restructuring of firms the abundance of skilled labor was used in a more efficient manner and technology gap narrowed by increasing FDI and joint venture activity in transition countries, Frank, (1997).

The transition of the Central and Eastern European countries from planned economies into market economies is a long process, which has a strong impact on foreign trade patterns. Podkaminer, (1998), divide the processes ongoing in Central and Eastern Europe into the following three stages:

Stage 1: System Transformation (1989-1994)

Stage 2: Catching-Up (1994-2010)

Stage 3: Integrated Europe

For each of the three stages, the main characteristics of the economic transition process and their impacts on the trade flows of the CEECs can be explained as follow:

#### 3.1.2.1 Stage 1: System Transformation

Stage 1 ranged from 1989 to 1994. In the first years of stage 1, the transition economies suffered from the transformation recession in most CEECs. Their economies had to absorb many shocks. They lost their traditional export markets due to the breakdown of the Council for Mutual Economic Assistance (CMEA), incomes and domestic demand decreased. Their terms of trade worsened, and they suffered from a shortage of foreign exchange. The dissolution of the CMEA and the Pre-Accession Strategy of the European Union has led to change the direction of former partners to Western Europe and to trade creation. The effects on the structure of East-West trade were an increase of inter-industry trade specialization, which based on the comparative advantages of the transition economies (i.e. cheap and relatively skilled labor force). The industrial structure of the CEECs underwent radical changes. From 1993 to 1994/95, the transition economies recovered from the transformation recession, the major part of system transformation have done. The growth of trade between east countries and industrial restructuring persisted. Economic development and the restructuring of the industrial structure of the CEECs led to further increase of inter-industry specialization. Moreover, the importance of intra-industry trade began to rise. In this stage, the CEECs succeeded in transforming their planned economies into free market economies. The most substantial reform projects been accomplished. Since this time, most of CEEC

economies have achieved a new growth path, despite great differences in development between countries as well as between industries. There was a significant progress in integrating their economies into the global trading system, Schneider, (1998).

### 3.1.2.2 *Stage 2: Catching-Up*

The second stage beginning with 1994 and 1995, the process of catching-up<sup>7</sup> determines the pattern of trade. In 1997, the per capita GDP of the four CEECs ranged from 37 % (Hungary), 42 % (Slovak Republic) to 57 % (Czech Republic and Slovenia) of EU (15) average. The economic development in the CEECs indicates that they will grow faster than the expected EU average. Podkaminer (1998) assumed a growth rate differential of 2 % to the EU average which is illustrated in table 11. In this case, no Central and Eastern European country will reach EU average until 2010. The Czech Republic is expected to reach the highest GDP per capita (74 % of EU (15) average).

**Table 11: GDP per capita for four CEECs (at current PPPs, US\$; % of EU (15) (average))**

Countries	1990	1991	1992	1993	1994	1995	1996	1997	2000	2005	2010
<b>Czech Republic</b>	62	54	52	54	54	56	58	57	61	67	74
<b>Hungary</b>	37	35	34	35	35	35	35	37	39	43	47
<b>Slovak Republic</b>	47	40	37	37	37	39	41	42	45	50	55
<b>Slovenia</b>	60	53	51	54	55	56	57	57	60	67	73

Notes: Projections assume no population growth and 4 % GDP growth in Eastern Europe.

GDP: Gross domestic product

PPP: purchasing power parity

Source: Podkaminer, (1998), (p. 19, table A/1).

The catch-up process also, not guaranteed to be succeeding, because of the CEE economies: dependence on the conjuncture of the Western European economies, internal and external imbalances, structural deficits (industry, infrastructure, and banking) and problems encountered in privatization process. Some countries are more successful in their catching-up process, while in other countries there may be no closure of an existing gap. The common problem for most of the transition countries is their

<sup>7</sup> Most authors think of income catch-up when they use the term 'catch-up process'. In a broader sense, the catch-up process includes the overall catching-up of the Eastern European economies to the level of the Western European countries. It also includes catching-up of organizational-institutional settings as well as a closure of the existing technological and product-quality gap. The most difficult problem for the CEECs seems to close the technology gap. Catching-up is not an automatically working process. Raising the standard of living of the CEECs requires the creation of institutional and organizational capabilities that put the economy on a higher growth path (Knell, 1996).

negative trade balance. This is especially true for the Czech Republic, which suffered from a severe feedback in 1997. The main reason for that feedback is that the Czech authorities tried to keep the nominal exchange rate constant since 1991, Landesmann, (1995).

Krugman and Obstfeld, (1994), stated that if there is a difference of the level of economic development between two countries they have reached, inter-industry trade will dominate the trade relations. If they have achieved a rather similar level of economic development, intra-industry trade will dominate. While inter-industry trade determined by endowment differences, intra-industry trade based on economies of scale. Scale economies give countries the incentive to specialize and trade even in the absence of differences between countries in their resources or technology. Furthermore, the catch-up process leads to an increase of the importance of intra-industry trade. However, the main part of the liberalization process already done. All EU restrictions on the import of industrial goods from the CEECs; removed by the end of 1997. In the opposite direction, there are still some barriers.

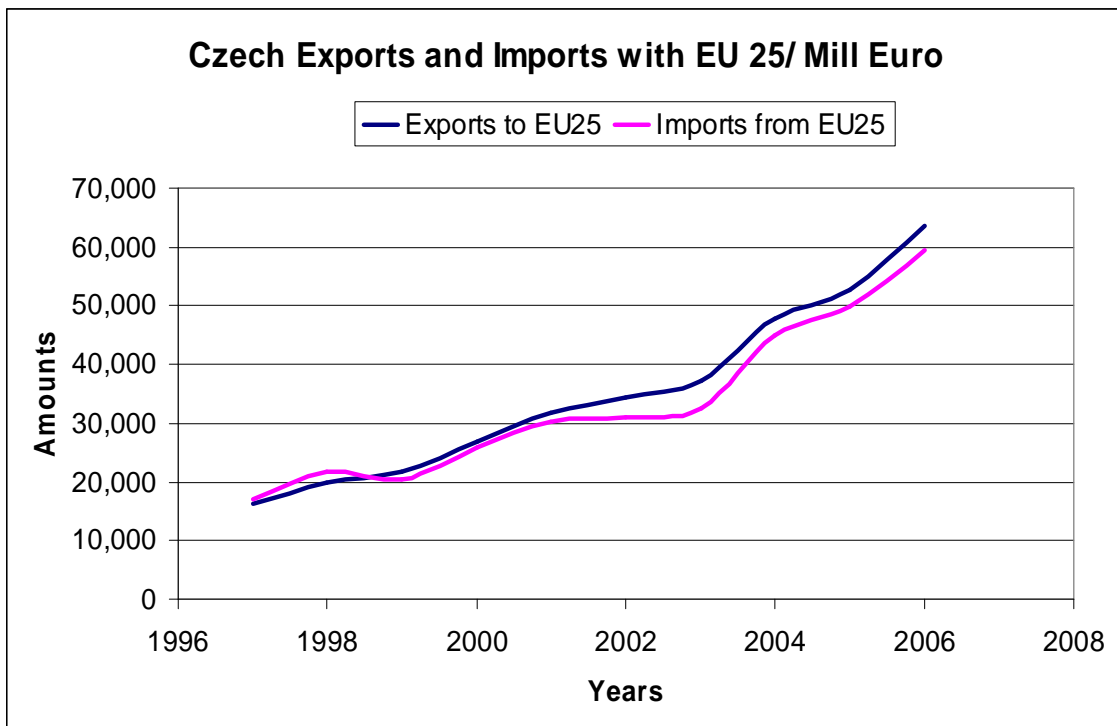
### *3.1.2.3 Stage 3: Integrated Europe*

When catch-up process succeeds, the income level of the CEECs will be similar to that of the EU average or at least to that of the poorer EU member countries. This will lead to a strong increase of intra-industry trade, which is typical for trade between countries that have obtained a rather similar level of economic development. When the CEECs will join the European Union as members (EU Eastern Enlargement), there will be only modest effects on trade. These effects are the de-regulation of agricultural products and the abolishment of anti-dumping rules and safeguard clauses; minor effects on trade expected from the elimination of border formalities and liberalization of trade with services, Schneider, (1998).

### **3.1.3 Czech foreign trade after the accession of EU**

Accession of Czech Republic to the EU on 1 May 2004 did not upset the Czech economy. Real GDP growth, year-on-year, rose to 4.4% in the first quarter of 2005, thanks mostly to greater gross fixed investment and favorable foreign trade results. Both export and import growth rates experienced an upswing during the accession period. Year-on-year, export growth rose from 13% in the first quarter of 2004 up to 33% in the second quarter, while export growth leapt from 11% to 31% over the same period. Later

on, this growth gradually decelerated; by the first quarter of 2005, it had dropped back to pre-accession levels. Exports, however, have grown faster than imports throughout; in the first quarter of 2005, the Czech Republic achieved an overall trade surplus amounting to 500 millions of EUR. April 2005 likewise ended with a trade surplus and the same held true for the period May 2004 to April 2005 as a whole. This improvement occurred despite accelerated GDP growth (which generally tends to boost import growth) and regardless of the 9% appreciation of the Czech koruna from Q1 2004 to Q1 2005 (3.04 against 3.33 EUR per 100 CZK), Poschl (2005).



**Figure 3.1: Czech Exports and Imports with EU 25/ Mill Euro**

Source: Author's own construction of the figure depending on table 12

Car companies and transport equipment have generated these high and ever-increasing surpluses. This trend is likely to strengthen with the new Toyota-Peugeot-Citroen plant in Kolín having started the process of production. It will be bringing out three versions of a small passenger car. Were it not for the acquisition of military equipment from abroad adding to import growth, the results would have been even better. In the longer term, the Czech Republic stands good chances of firming up its position as a trade-surplus country, Poschl (2005).

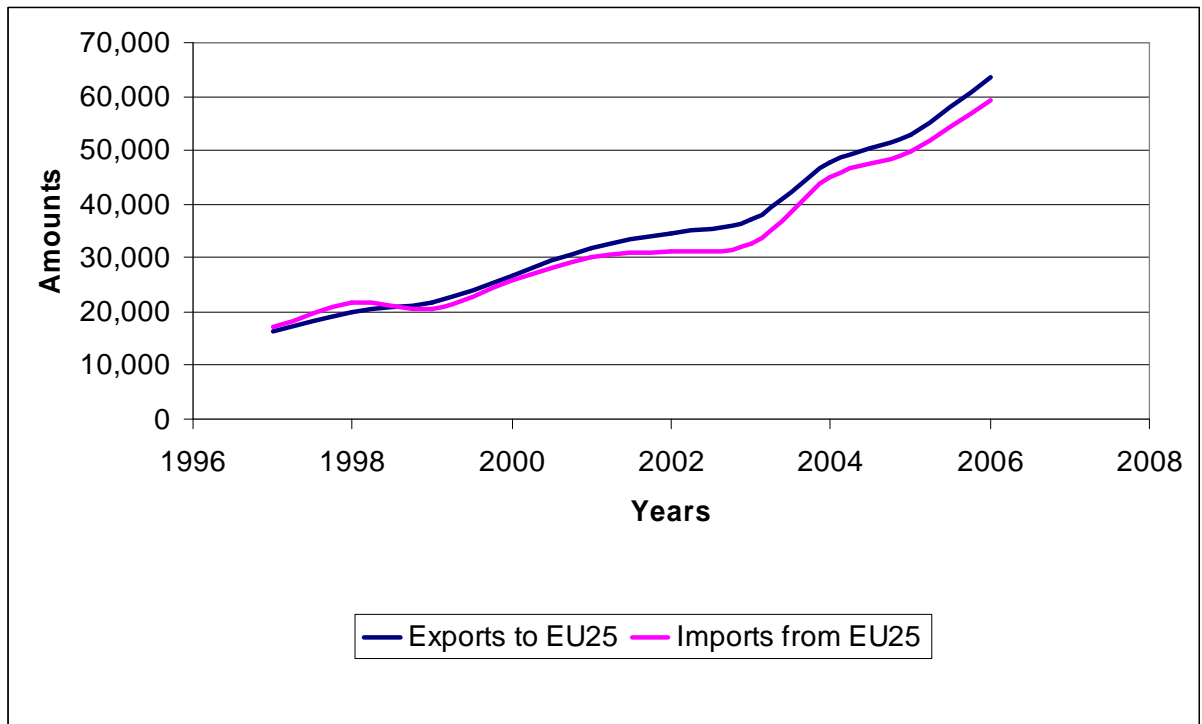
**Table 12: Balance of trade in Czech Republic with EU25 and EU27/Mill euro**

<b>Years</b>	<b>Exports to EU25</b>	<b>Exports to EU27</b>	<b>Imports from EU25</b>	<b>Imports from EU27</b>	<b>Balance of trade with EU25</b>	<b>Balance of trade with EU27</b>
<b>1997</b>	16,354	16,485	17,139	17,139	-758	-654
<b>1998</b>	19,832	20,070	21,574	21,574	-1742	-1504
<b>1999</b>	21,582	21,800	20,396	20,396	1186	1,360
<b>2000</b>	26,775	27,063	25,958	25,958	817	1,040
<b>2001</b>	31,811	32,184	30,131	30,131	1680	1,959
<b>2002</b>	34,467	34,893	31,068	31,068	3399	3,703
<b>2003</b>	37,156	37,588	32,481	32,481	4675	4,930
<b>2004</b>	47,687	48,330	44,966	44,966	2721	3,171
<b>2005</b>	52,800	53,702	49,810	49,810	2990	3,636
<b>2006</b>	63,568	64,789	59,387	59,387	4181	5402

Source: Eurostat, yearly statistical book, 2006.

Table 12 shows a big improvement in both exports and imports after the accession of Czech Republic to EU. In 1997 before the accession of CZ to the European Union there was a trade deficit amounted 758 million Euros with EU25 and 654 million Euro deficits with EU27to, but after the accession of CZ to EU, especially in 2006 there was trade surplus amounted 4181 million Euros with EU25 and 5402 million Euros with EU27. Overall the improving trade balance, coupled with its positive impact on the current account and the high inflow of foreign direct investment, tends to build up pressure in favor of currency appreciation. In keeping with its managed floating regime, the Czech National Bank (CNB) has endeavored to keep appreciation at a modest level to prevent any stress in terms of the Czech enterprises' competitiveness. The CNB adheres to interest rates that rank among the lowest in Europe; it also cooperates closely with the government in order to avoid accretion of appreciation pressure due to the marked inflow of FDI.





**Figure 3.2: Czech Exports and Imports with EU 27/ Mill Euro**

Source: Author's own construction of the figure depending on table 12

### ***3.2 Impact of FDI on Foreign Trade in the Czech Republic***

#### **3.2.1 The Importance of FDI**

The collapse of communism in Central and Eastern Europe Countries (CEECs) and the needs of a market economy have led to a large inflow of FDI into these countries during the last decade and in particular since the mid 90's. Policy makers in CEECs faced the collapse of most of the state sectors and slowly growing private sectors. With financial markets and commercial banking virtually absent, they encouraged foreign investors to take part in the privatization process or to invest in their countries. Given the enormous increase in foreign investment in these countries, they provide an ideal natural experiment for measuring the impact of incoming foreign investment on performance and quality of the goods in the economy especially for the domestic firms. Host countries welcomed foreign investment to generate positive externalities to the domestic firms through a transfer of technology, like introduction of new products and production processes will benefit domestic firm's quality through the accelerated diffusion of new technology, this could occur through labor turnover or through imitation of goods produced by foreign firms.

A number of recent theoretical papers show that domestic firm's benefit from such spillovers depends on the "absorptive capacity" of domestic firms. Sanna-Randaccio (2002) shows that FDI always leads to an increase in the productivity and quality of the goods of the investing firm, however, FDI increases the host country's productivity only if the degree of the technological spillover is high enough. The spillover technology is more likely to achieve in sectors characterized by intensive R&D or by firms, which have a sufficient amount of knowledge to deal with this new technology. Inflowing FDI to the host countries, lead up to positive effects on domestic firm's product and high levels of productivity. However, there may exist a competition effect, which works in the opposite direction. In the same time, foreign entry disturbs the existing market equilibrium and could force domestic firms to produce less output which pushes them up their average cost curves, at least if average cost curves are downward sloping, which would be the case if production involves a substantial fixed cost. Aitken and Harrison (1999) have developed this argument and said that, dominates depends on the strength of the technological spillover effect (and the absorptive capacity of firms) versus the competition effect.

In Czech Republic FDI has been a main source of necessary investment for renewing the industrial structure, bringing modern technology improving management skills, and improving the quality of the goods produced in the economy and then facilitating access to the international market competition. Hanousek and Munich (2000) shows that lifting barriers to foreign investment, along with expanding foreign trade with the major industrialized economies, will create the rapid increase in productivity and quality of the goods produced and consequently, the growth of the Czech economy. Empirical data on Czech manufacturing firms in the period 1993-1998 shows that firms with foreign participation perform higher levels of productivity and quality of the goods than the domestic firms, this fact confirms the important role of FDI. Kosova (2005) stated that there are two kinds of impact from FDI on Czech domestic firms, positive and negative. Positive impact provides spillover technology for domestic firms to perform better quality goods when they know how to use this new technology or when the technological gap between foreign firms and domestic firms are not very big. Negative impact from foreign firms is to force domestic firms to go through competition process which required high quality of the goods and competitive price, which is difficult for the domestic firm which don't have new technology and skilled workers, the result will be crowding out for the domestic firm.

### **3.2.2 FDI and it's impact on the economy in the Czech Republic**

Dusek and Kresimir (2005) stated that, the importance of FDI for the Czech Republic economy seems clear, FDIs, among other things, are likely to bring in new capital, new technology, increase employment and gross domestic product and to improve in the longer run the host country balance of payment. Some of these positive effects of FDI are supposed to magnify through so-called technological spillovers, which broadly defined as the indirect positive effects that FDI can have on the rest of the economy, especially on the related upstream and downstream industries. In addition, FDI can have a significant effect on firms' quality goods and industries' restructuring and the change of the structure of the whole economy. Despite the fact that the empirical quantification of the above effects is rather difficult and, at the moment, very incomplete, it can be argued with a high degree of certainty that FDI inflow in the Czech Republic has contributed to all of the above positive effects. However, it is also worth noting that inducing desirable FDI has its social costs in the form of the incentives schemes (investment in infrastructure, tax holidays, financial support for the creation of new jobs, etc.) as well as the costs associated with the displaced domestic firms that cannot survive foreign competitiveness.

Manufacturing sector took the largest amount of FDI in the EU accessing countries and the Czech Republic is no exception. Foreign enterprises account for over 60% of manufacturing output in the Czech Republic, 70% of depreciation of physical capital, and more than three quarters of exports. Moreover, 60% of the total foreign assets (or cumulative FDIs) are concentrated in three manufacturing industries: motor vehicles, food products and tobacco, and non-metallic minerals. The car industry is the most important production sector of the Czech Republic, generating around 17% of total Czech manufacturing output and 26% of total exports, Dusek and Kresimir (2005). These numbers mentioned above in the industry is a clear example of FDIs positive influence on the rest of the economy that occurs through the above-mentioned downstream linkages. Such linkage affects the structure of the economy, on its long run social welfare and economic growth rate. Namely, if foreign firms established through FDI engage in intensive relations with local suppliers and customers, these foreign firms usually impose new rules and discipline for domestic firms as well. Even in the absence of foreign investment, local suppliers forced to meet demands for higher quality and on-time delivery and to innovate more. Moreover, the foreign firms usually provide

technical assistance and training to local suppliers, improving their expertise, quality of the goods that they produce, human capital, and assist them in purchasing raw materials in order to improve the quality of intermediate goods.

In addition, Dusek and Kresimir (2005) stated there is no exact measure of the importance of the above linkages; it seems that they are significant given that in the Czech Republic there were about 280 manufacturing enterprises operating in the automotive industry until 2002, more than half of which are foreign companies. Another manufacturing industry that experienced similar effects as the automotive industry is the rapidly growing electronics industry. The break points in its development occurred in the years 1993 and 1996–1997, when several of the world's largest multinational corporations made significant investments in the Czech electronic industry (one of the first investments made in 1993 by Siemens and amounted to 37 millions USD). The next period of investments occurred in 1996–1997 when the Asian and North American producers of electronics invested in several companies.

### **3.2.3 FDI and Foreign trade in Czech Republic**

In the Czech Republic there were strategic factors influencing the trade structure and dynamics: changes in endowments of physical and human capital, inflows of FDI, developments in productivity and wages, enterprise pricing policies and the nature of Czech economic competitiveness vis-à-vis the world markets. This includes the switching from competition in prices to competition in quality, and the rising role of differentiated products and intra-industry trade. There are also the positive effects of lifted tariffs, accelerating inflows of FDI and exceptionally fast changeover in Czech exports towards products with higher unit prices. While exports and FDI inflows offer growth and employment, accelerating import penetration requires the downsizing of many industries, which burdens the completely Czech economy with high adjustment costs. Now, in a period of economic structural stabilization and EU accession, the prospects for accelerated economic growth are much higher, Vladimir, Ladislav and Jan, (2003).

**Table 13: FDI and macro variables in the Czech Republic from 1996 to 2006**

Years	Inward FDI in the Czech Republic/ Mill. CZK	GDP at purchaser prices Mill. CZK	Export, Goods Mill. CZK	Labor productivity: Gross Domestic Product in PPS <sup>8</sup>	Average gross yearly wages and salaries of employees Mill. CZK
1996	38775	540155	48388.0	59	9825
1997	41251	529070	62812.0	58	10802
1998	119969	528693	59128.0	57	11801
1999	218812	541162	79072.0	59	12797
2000	192421	561001	90630.0	59	13614
2001	214585	571877	90140.0	60	14793
2002	277689	582350	92293.0	60	15866
2003	59316	604683	112252.0	64	16917
2004	127844	633227	136191.0	66	18041
2005	279181	675372	150355.0	67	19024
2006	135984	714631	170231.7	69	20211

Source: Czech National Bank.

This table shows that the relation between FDI and most of the macroeconomic variables are going in the same direction, which means the relation is positive. If we regret the econometric equation between FDI as independent variable and each of the macro variables, we will get the strong relation between FDI and each variable separately. The time serious data shows that FDI increased during these periods and in the same time all the macro variables mostly increased, which means economic development in the country especially in exports.

The entry of new firms (either foreign or domestic) is the most important element for fast restructuring of an economy and the most powerful way to sustain economic growth in the end. Furthermore, the old firms in the transitional countries, which include state enterprises and unstructured privatized firms, cannot compete so well in a market environment and its prolonged support through budgetary subsidies, quasi-fiscal operations, tax offsets and arrears represents an inefficient use of resources and slows down the economic growth rate. However, it is essential that policy makers discipline the old sector through the imposition of hard budget constraints, exposure to competition and facilitation of exit procedures. One reason for this is the market for factors that downsizing of old enterprises makes available to new firms. The interaction between old firms and new firms lies at the heart of the growth process.

<sup>8</sup> pps = purchasing power standards

### ***3.3 Exchange Rate and Growth in Foreign Trade***

The stability of the exchange rate and a type of its regime are important elements in the overall monetary policy of each country. The significance of the matter even more accentuated in the case of transition economies because international lending institutions like the International Monetary Fund, the World Bank, and the European Bank for Reconstruction and Development provide credit subject to macroeconomic stability and a stable exchange rate. This is true no matter what kind of regime adopted. Any country in transition must undergo a stage of macroeconomic stabilization, which inevitably accompanied by large shocks to macroeconomic fundamentals, and the success of the stabilization programs in transition economies is especially important for policymakers. The necessity of close economic relations among transition economies in Central and Eastern Europe and between these countries and the European Union, the exchange rate and the exchange rate regime play an important role in economic development.

#### **3.3.1 Exchange rate and its regime in transition countries**

In the first stage of the transition process in Central and Eastern European economies, exchange rate behavior and associated exchange rate regimes closely monitored. Sachs (1996) stated that the choice of a particular exchange rate regime is one of the major policy decisions countries in transition had to make. Exchange regimes and the evolution of nominal exchange rates relative to major currencies differ widely across the transition countries. The Czech Republic and Slovakia favored the semi-fixed regime of a basket peg, while Hungary moved from an adjustable peg to a pre-announced crawling band<sup>9</sup> in 1995, and Poland moved from a fixed basket peg to a crawling basket peg. Many other countries in the region favored a managed float or currency board. Table 10 summarizes the types of exchange rate regimes that the CEECs have adopted since their economic transition.

The fundamental task is how the exchange rates themselves evolved during the transition process, because the strength of a currency normally corresponds to the strength of an entire economy. Therefore, exchange rates have to be considered as a

---

<sup>9</sup> An automatic system for revising the exchange rate. It involves establishing a par value around which the rate can vary up to a given percent. The par value is revised regularly according to a formula determined by the authorities.

monetary mirror of a real side of an economy as a whole. When we take into the account a high degree of openness of the CEE economies we have to admit that exchange rate is an important variable within the scope of how these economies are becoming interconnected, Koch (1997). Table 8 summarizes the types of exchange rate regimes that the CEECs have adopted since their economic transition.

**Table 14: Exchange Rate Regimes in selected CEECs**

<b>Country</b>	<b>Regime</b>
<b>Czech Republic</b>	Fixed (basket peg) since January 1991 to May 1997 Float from May 1997
<b>Slovakia</b>	Fixed (basket peg) since January 1991
<b>Hungary</b>	Adjustable peg (basket peg) since before 1989 Pre-announced crawling band (peg) since March 1995
<b>Poland</b>	Fixed (basket peg) from January 1990 to October 1991 Pre-announced crawling peg from October 1991 to May 1995 Float within crawling band from May 1995 to January 1996 Pre-announced crawling peg from January 1996
<b>Slovenia</b>	Managed float from October 1991
<b>Bulgaria</b>	Managed float from February 1991 Currency board from July 1997
<b>Romania</b>	Managed float from August 1992
<b>Albania</b>	Managed float from July 1992
<b>Estonia</b>	Currency board from June 1992
<b>Latvia</b>	Managed float from July 1992 (in reality peg to SDR basket)
<b>Lithuania</b>	Float from October 1992 to April 1994 Currency board from April 1994

Source: Evžen Kocenda, Exchange Rate in Transition, CERGE, Charles University 1998.

### **3.3.2 Nominal Exchange and Real exchange Rate**

Real exchange rate based on the GDP deflator measurement of the price level in the domestic and foreign countries, which are arbitrarily set, equal to one in a given base year. In case of transition economies is likely to be substantially differentiate nominal and real sides of the story. In order to see the real evolution of the Czech national currency we explore the real exchange rates. For the purpose of econometric analysis, the real exchange rates ( $Q_t$ ) of Czech currency in relation to the US Dollar constructed in the usual manner as, Kocenda, (1998):

$$Q_t = E_t \times \text{CPI}_t^* / \text{CPI}_t$$

Where:

$Q_t$ : is the defined real exchange rate,

$E_t$ : is a nominal exchange rate

$\text{CPI}_t$ : is a domestic consumer price index (CPI)

$\text{CPI}_t^*$ : is a foreign CPI

### **3.3.3 Exchange Rate Regime in Czech Republic**

In the Czech Republic, fixed exchange rate regime was introduced on January 1st 1991, and persisted for more than six years. It was seen by some policy makers and by part of the public as a symbol of the Czech success. However, a worsening of the macroeconomic situation in the second half of the 1990s, combined with political instability at the beginning of 1997 and with contagious effect from the Asian crisis led to the abandonment of the peg. In addition, the introduction of the managed float regime in May 1997 and has changed the perception of the Czech transition performance, Buch and Heinrich, (1997).

The mixture of macrocosmic stability with inflation differential led to fast real appreciation. The appreciation and the introduction of convertibility meant that the pegged exchange rate could no longer play its stabilization role, and after speculative attacks; the crown allowed to float in 1997. Along with this move, the Czech National Bank adopted in 1998 inflation targeting as a key monetary instrument instead of the preceding exchange rate anchor. The (lightly) managed floating regime has remained unchanged until now; although changes must be expected that the Czech Republic is going to join the European Monetary Union (EMU) in the future. Considering only changes in the basic framework of the Czech exchange rate policy, the year 2007 can hardly seem exceptional. The crown kept its managed floating regime and adoption of the Euro played the role of reference currency, as this role were dictated by the share of EU in Czech foreign trade (85% of exports, 71% of imports in 2007). While the Czech crown was relatively weaker in the first half of 2007, a very steep growth in the value of the Czech crown started in the second half of 2007 and continuing appreciating for most of its history as shown in table 15 below. The second half of 2007 and the beginning of 2008 brought nominal and real appreciation with respect to the U.S. dollar than with respect to the Euro (23% and 10% between March 2007 and 2008 respectively), CERGE-EI, (2008).



**Table 15: Monetary indicators in the Czech Republic**

Years	CZK/EUR avrg.	CZK/USD avrg.	Nominal exchange rate %, y/y	Real exchange rate %, y/y	Exchange rates %, y/y, avrg.
1997	-	31.711	-5.4	-	0.1
1998	-	32.274	0.5	-	7.2
1999	36.882	34.6	1	-2.3	-2.7
2000	35.61	38.59	1.4	2	-5.1
2001	34.083	38.038	4.2	5.4	1.9
2002	30.812	32.736	11.5	9.6	2
2003	31.844	28.227	-0.3	-1.9	1.2
2004	31.904	25.701	0.6	3.3	2.1
2005	29.784	23.947	6.4	5	-1
2006	28.343	22.609	5.2	2.5	-1.5
2007	27.762	20.308	2.6	2.8	2.3
2008	24.942	17.035	11.6	9.6	-1.3

Source: CZSO, CNB and ministry of finance of the Czech Republic

### 3.3.4 Appreciation of Czech Currency

In the case of Czech Republic when analyzing changes in exchange rates, it is necessary to differentiate between the position of the Euro and other currencies. The position of the Euro is specific because of the high share of the EU and the Euro zone as it shown in table 6. In Czech foreign trade and exchange rates between CZK and all other (non-Euro) currencies depend on the exchange rates of these third currencies and the Euro, and changes in the CZK/EUR exchange rate. A large part of the appreciations caused by the declining value of the U.S. dollar (and of currencies directly or indirectly tied to the dollar). Two causes can explain the long-run trend towards real appreciation as a natural and equilibrium phenomenon. Firstly; gradual improvement in the marketability of Czech products in foreign markets mainly quality upgrades, improved marketing and distribution networks; Secondly, a higher growth of productivity in the tradable sectors. These two effects explain why currencies of successful transition and emerging economies should appreciate in the long period and predict that this type of real appreciation does not endanger the price competitiveness and external balance of the economies.

However, even though both of these effects predict long-term and gradual appreciation, they are hardly sufficient to explain the rapid changes experienced by the Czech crown

in 2007 and early 2008. The more likely culprit in this case were the economic turbulences experienced by developed economies (especially an economic slowdown and problems of the financial sector in the U.S.) that contrasted with fast economic growth and relative stability of selected transition economies. CERGE-EI, (2008).

### **3.3.5 Economic Implications of the Appreciation**

The recent appreciation of Czech currency exceeds productivity growth. Table 15 and table 13 show the index of the real effective exchange rate of the Czech crown and the productivity of labors. This indicator measures the impact of changes in exchange rates and takes into account possible compensation of the changes by increases in relative productivity or labor. Table 15 shows that the rate of appreciation experienced by CZK since the end of 2007 was too fast. The net real appreciation and negative impact on exporters' profits it was not valuable, because this development has not caused substantial damage to Czech companies so far, but the risk of defaults of exporters will be gradually increasing. Furthermore, the strong crown is likely to negatively influence the inflow of foreign tourists and therefore decrease the surplus on the service account of the balance of payments. On the other hand, the appreciation also played a positive role in case of positive impact on their purchasing power abroad.

In addition, Appreciation of the real exchange rate is clearly a handicap to Czech exports, especially to exports to non-EU countries. Nevertheless, in the EU case, the appreciation were countervailed by tariff concessions, improved quality, and switchover to commodities with higher contents of value added, gains associated with FDI and growing foreign demand absorption. Furthermore, this appreciation of the real exchange rate has significantly opened the Czech market to imports but the unconstrained import penetration were blocked in the recent past by the growing competitiveness of Czech products (competing in costs, prices and quality), Flek, Markova, and Podpiera, (2002). The possible negative impacts of real appreciation of Czech currency on Czech exporters, needs development of exchange rates between the crown and currencies other than Euro as before, determined primarily by the development of the EUR/USD exchange rate and by the relative economic development in the U.S., EU, and Eastern Asia. The pressure felt by Czech exporters has led to renewed discussions about the speed of adopting the Euro; some of the exporters hope that a fixed exchange rate between the Czech currency and the Euro would protect their price competitiveness at least for exports to EMU markets. However, unlike Slovakia, the Czech Republic did

not introduce the Euro in January 2009. The Czech government and the CNB have not even set any binding target date for Czech entry into the Euro zone; their position remains cautious mainly because of alleged inflation threats related to premature adoption of the Euro, Benáček, Prokop, and Vášek, (2003).

### **3.3.6 Exchange Rate and foreign Trade in Czech Republic**

The Czech Republic following floating exchange rate regime system since May 1997, and according to (Johnson, 1969), flexible exchange rate regime would reduce protectionist tendencies and promote foreign trade. Moreover, floating exchange rates would provide macroeconomic independence, by bearing the burden of adjustment vis-a-vis imbalances in the 'current' and 'capital' accounts of the balance of payments. Johnson (1969) stated that exchange rate volatility associated with the floating exchange rate regime did not pose any potential threat to the growth of international trade and macroeconomic stability partly because hedging facilities would protect one against risk. In addition, exports remain an important factor for economic growth (Balassa, 1989) and hence a competitive exchange rate may be a useful possible anchor for export growth. In contrast to the above, some literature suggests that exchange rate variability under the floating exchange rate regime may be detrimental to exports because of risk averseness hypothesis; this is partly because markets may be imperfect particularly in less developed countries, Doroodian, (1999).

For the exchange rate in the Czech Republic, in 1990 the national bank devaluated the crown to 24 Czechoslovak crowns (CSK) to 1 USD and it immediately changed to 28CSK/1USD, this in hopes of helping international trade. Development after 1991 marked a period of currency appreciation in real terms year after year. The cause of the real appreciation under the stable nominal exchange rate regime was because of the differences in inflation between the rate in the Czech Republic and that of the Western European countries. It made it harder for exporters to make a profit after the decline in the favorable economic conditions that created after the devaluation in 1990 and the reduction in demand affected their biggest trade partners most. Any situation that made it harder to trade with Germany (43% of exports in 1999) or any of the EU countries (59.9% of exports in 1997) would have adverse affect on the entire Czech economy. In the second quarter of 1997, the central bank of the Czech Republic was no longer able to face pressures on the Czech currency. In addition, they changed their foreign exchange rate regime from a stable nominal exchange rate to a floating one. This helped

trade conditions immediately and the new floating exchange rate would move depending on the market conditions and give a better picture of how the economy was doing, Blaikie, (2001).

The opening of the economy in the Czech Republic, its initial relative low competitiveness and the resulting need to invest led to a sustained balance of trade deficit. This changed in 2005 and 2006, the Czech Republic is likely to remain a net exporter in the near future, and attributed to the pro-export orientation of the inflow of foreign investment motivated by accession to the EU. The accession and recent economic history defined the position of the Czech Republic as a country with full member status which means that trade barriers with the EU have been removed and cannot be reintroduced combined with lower labor costs, CERGE-EI (2007).

**Table 16: Exchange rate and foreign trade in Czech Republic**

<b>Years</b>	<b>CZK/EUR avrg.</b>	<b>CZK/USD avrg.</b>	<b>Exports/ Bill. USD</b>	<b>Imports/ Bill. USD</b>	<b>Trade balance</b>
<b>1997</b>	-	31.711	22.8	27.2	-4.4
<b>1998</b>	-	32.274	28.3	30.5	-2.2
<b>1999</b>	36.882	34.6	26.8	28.8	-2
<b>2000</b>	35.61	38.59	29.2	32.2	-3.2
<b>2001</b>	34.083	38.038	33.4	36.5	-3.1
<b>2002</b>	30.812	32.736	38.5	40.7	-2.2
<b>2003</b>	31.844	28.227	49.2	51.2	-2.2
<b>2004</b>	31.904	25.701	67.2	68.1	-0.9
<b>2005</b>	29.784	23.947	78.2	76.5	1.7
<b>2006</b>	28.343	22.609	95.1	93.4	1.7

Source: CZSO, OECD, CNB and ministry of finance of the Czech Republic

Empirical data from table 16 shows the positive relationship between the exchange rate and foreign trade both imports and exports. The appreciation of Czech currency continues year-by-year does not affect negatively on the foreign trade, which is due to the comparative price of Czech goods and improvement in the quality of the goods, which exported especially to the EU members. In addition, after year 2004, the accession of Czech Republic to EU there was a big Improvement in Foreign trade, which amounted 78.2 Billion USD in year 2005 and 95.1 Billion USD in year 2006 for exports. The same situation explained for imports for these two years.

### ***3.4 The Impact of EU members on Czech Exports***

After the post-communist economies and the process of their integration into the EU, there were a big positive impact on the structure of their specialization and external competitiveness. However, the diversion of trade from the East to the West and sector restructuring to an extent unparalleled in European history, did not lead to high overall growth immediately. At the same time, nominal and real exchange rates remained at levels far below the benchmarks expected by purchasing power parity. After initial losses in output, employment, the real exchange rate, unit labor costs and the terms of trade, the transition economies rallied. Transition economies were able to withstand the competition on world markets and they adjusted for EU membership. Their real exchange rates began to appreciate, real wages rose and exports increased exponentially, reflecting gains in competitiveness. In all transition economies, the highest rates of trade growth achieved in trade with the EU. For example, during 1993–2001, Czech exports to the EU rose from EUR 6.3 billions to EUR 25.6 billion. This fourfold increase implied average annual real growth in exports to the EU of a remarkable 16.2%, while Czech exports to the rest of the world grew at a normal rate of 2%. At the same time, trade creations with OECD partners accompanied by a large trade diversion from the nation's former partners grouped in COMECON, Vladimir, Jiri and Ladislav, (2005).

Czech trade deficit and their developments between 1993 and 2002 divided into two periods. First, one dating from 1993 to 1996 connected with a huge deterioration of the trade deficit to CZK 153 billion in 1996, while the second one saw a remarkable improvement, especially with respect to trade with the EU. During the initial period, final consumption and investments grew quickly, reflecting the recovery of economic growth. Goods imports increased rapidly to substitute for the only slight response of domestic supply to the increased demand and the changing structure of demand towards high quality commodities. The increased import growth initially followed by less significant export growth. In addition, the difficulties in placing Czech goods on foreign markets were caused mainly by; (i) a breakdown of the traditional COMECON market, which had absorbed the bulk of Czech exports prior to 1993; (ii) The still low competitiveness of Czech production; and (iii) changing ownership relations in firms and as yet unfinished company restructuring, Vladimir, Ladislav and Jan (2003).

In contrary, the period of 1997–2002 is associated with a gradually improving trade balance trend. In 2002, the trade deficit was only CZK 71.3 billion, more than 50% lower than in 1997. In that year, the implementation of restrictive macroeconomic policies (responding to increasingly imbalanced developments in the balance of payments) had contributed to a significant reversal of the sizable trade deficit trend. Moreover, following 1997 the inflow of FDI connected with the privatization of Czech state enterprises to foreign owners (more precisely, the sale of controlling shares to foreign owners) was the most favorable influence, causing in effect strong export growth. Nevertheless, the downward trend in the trade deficit was not continuous. In 2000 and 2001, the deficit temporarily increased again compared to the previous two years. This was due mainly to a rapid increase in import prices of fuels (especially crude oil and natural gas) and to higher investment imports of engineering commodities because of major restructuring and modernization. Even though the level of import prices of fuels remained very high in 2002, the higher value of fuel imports offset by additional exports because of the positive effects of FDI inflows, leading to a moderate improvement in the trade deficit, Badinger and Tondl, (2002).

The most important determinants of Czech trade with the EU-15 are the level of aggregate demand (both domestic and in the EU-15), the real exchange rate, liberalization of tariffs and the evolution of unit prices of exports and imports. Economies of scale also proved to be a highly significant factor, along with a sharply rising importance of intra-industry trade. These factors boosted export penetration and more than compensated for the adverse effects of the appreciated real exchange rate on the trade balance. The Czech balance of trade with the rest of the world is most explained by domestic GDP, qualitative upgrading in the unit prices of exports, domestic production prices, foreign direct investment, economies of scale and intra-industry trade, Pelkmans, (2002).

**Table 17: Evolution in volumes traded and unit prices in the Czech exports and imports with the EU**

<b>Year</b>	<b>X tones mil.</b>	<b>M tones mil.</b>	<b>X price per kg in CZK</b>	<b>M price per kg in CZK</b>	<b>M/X* relative price/ kg</b>	<b>Growth in X price</b>
<b>1993</b>	20.63	4.45	10.77	53.78	4.99	n.a.
<b>1994</b>	26.13	5.76	10.30	51.49	5.00	-4.4%
<b>1995</b>	25.07	6.42	13.66	63.20	4.63	32.6%
<b>1996</b>	22.79	7.59	15.47	62.09	4.01	13.3%
<b>1997</b>	23.10	8.79	18.36	60.43	3.29	18.7%
<b>1998</b>	23.47	9.35	22.75	62.07	2.73	23.9%
<b>1999</b>	25.53	10.36	24.63	60.31	2.45	8.3%
<b>2000</b>	25.80	11.05	29.79	69.70	2.34	21.0%
<b>2001</b>	25.07	11.95	34.91	71.71	2.05	17.2%
<b>2002</b>	23.60	12.17	36.28	65.57	1.81	3.9%

Source: Czech trade statistics, own calculations. CSU; Prague, 2002.

\* X denotes Export and M denotes Import.

Table 17 shows that exports to the EU went down after 1994, their total value increased and the per-kilogram prices increased between 1994 and 2001. Therefore, the structure of exports must also have shifted in favor of products of higher quality or higher value added per unit. No such breakthrough has been in the Czech imports, where shifts to products of higher quality (above the long-term inflationary trend) can be only in 1995 and 2000. Catching-up of the Czech economy with the EU progressed visibly throughout 1993–2001. The ongoing appreciation of the Czech crown was only a small part of the profound changes.

## **4 Integrating Econometric Methods and Input-Output Analyze for Foreign Trade in the Czech Republic**

### ***4.1 Econometric Models for testing Foreign trade***

#### **4.1.1 The Importance of Econometrics**

Econometrics means quantitative measurement and analysis of actual economic and business phenomena. It attempts to quantify economic reality and bridge the gap between the abstract world of economic theory and the real world of human activity. Econometrics allows us to examine data and to quantify the actions of firms, consumers, and governments. Such measurements have a number of different uses, and an examination of these uses is the first step to understand econometrics. Moreover, Econometrics is based upon the development of statistical methods for estimating economic relationships, testing economic theories, and evaluating and implementing government and business policy. The most common application of econometrics is the forecasting of such important macroeconomic variables such as interest rates, inflation rates, exports and gross domestic product. While forecasts of economic indicators are highly visible and are often widely published, econometric methods can be used in economic areas that have nothing to do with macroeconomic forecasting. For example studying the effects of political campaign expenditures on voting outcomes, or school spending on student performance of education, Wooldridge (2003).

#### ***Uses of econometrics***

Econometrics has three different uses:

- 1- describing economic reality
- 2- testing hypotheses
- 3- Forecasting future economic activity

The simplest use of econometrics is descriptions, econometrics quantify economic activity because allows us to estimate numbers and put them in equations that previously contained only by abstract symbols. For example, export of particular good can be thought of as a relationship between the quantity exported (EX), and the good's price (P), and labor productivity (LP). Econometrics actually estimates that relationship between export and the other two independent variables. In other words, a general theoretical relationship is like:



$$EX = f(P, LP) \quad (4.1)$$

Can become explicit:

$$EX = b + b_1P + b_2LP \quad (4.2)$$

The constants  $b + b_1P + b_2LP$  are the parameters of the econometric model, and they describe the directions and strengths of the relationship between export and the factors used to determine export in the model.

A complete econometric model for Example 4.2 might be:

$$EX = b + b_1P + b_2LP + u \quad (4.3)$$

Where the term  $u$  contains factors such as Gross Domestic Product (GDP), imports of investment goods, exchange rate of the currency (ER), real labor wages (LW), foreign direct investment (FDI), and the other factors that can influence the export.

The second common use of econometrics is hypothesis testing. Once an econometric model such as (4.2) or (4.3) has been specified, various *hypotheses* of interest can be stated in terms of the unknown parameters. For example, in equation (4.2) we might hypothesize that price of particular good, has no effect on exports. In the context of this particular econometric model, the hypothesis is equivalent to  $b_1=0$ . An empirical analysis, by definition, requires data. After data on the relevant variables have been collected, econometric methods are used to estimate the parameters in the econometric model and to formally test hypotheses of interest, Studenmund (2006).

The third and most difficult use of econometrics is to forecast or to predict what is likely to happen next quarter, next year or further to the future, based on what has happened in the past. For example, economists use econometric models to make forecasts of variables like sales, profits, foreign trades, Gross Domestic Product, and the inflation rate. The accuracy of such forecasts depends in large measure on the degree to which the past is a good guide to the future. Business leaders and politicians tend to be especially interested in this use of econometrics because they need to make decisions about the future, and the penalty for being wrong (bankruptcy for the entrepreneur and political defeat for the candidate) is high. To the extent that econometrics can shed light on the impact of their policies, business and government leaders will be better equipped to make decisions, Studenmund (2006).

### **4.1.2 The Simple Regression Model**

The simple regression model can be used to study the relationship between two variables, and has limitations as a general tool for empirical analysis. Nevertheless, it is sometimes appropriate as an empirical tool. Learning how to interpret the simple regression model is good practice for studying multiple regression models as well.

#### *4.1.2.1 Definition of the Simple Regression Model*

Much of applied econometric analysis begins with the following that:  $y$  and  $x$  are two variables, represents some population, and we are interested in explaining  $y$  in terms of  $x$ , or in studying how  $y$  varies with changes in  $x$ . We assume that  $y$  is yearly export for Czech Republic and  $x$  is inflows of foreign direct Investment to the Country. We can write down an equation relating  $y$  to  $x$ . A simple equation is, Stock and Watson (2008):

$$y = b_0 + b_1x + u \quad (4.4)$$

Equation (4.4), defines the simple linear regression model. It is also called the two-variable linear regression model because it relates the two variables  $x$  and  $y$ . the variable  $y$  can be explain as a dependent variable and  $x$  is independent variable. The variable  $u$ , called the error term or disturbance in the relationship, represents factors other than  $x$  that affect  $y$ . A simple regression analysis effectively treats all factors affecting  $y$  other than  $x$  as being unobserved.

Equation (4.4) also addresses the issue of the functional relationship between  $y$  and  $x$ . If the other factors in  $u$  are held fixed, so that the change in  $u$  is zero,  $\Delta u = 0$ , then  $x$  has a *linear* effect on  $y$ :

$$\Delta y = b_1 \Delta x \text{ If } \Delta u = 0 \quad (4.5)$$

Thus, the change in  $y$  is simply  $b_1$  multiplied by the change in  $x$ . This means that  $b_1$  is the slope parameter in the relationship between  $y$  and  $x$  holding the other factors in  $u$  fixed; it is of primary interest in applied economics. The intercept parameter  $b_0$  also has its uses, although it is rarely central to an analysis.

#### *4.1.2.2 Ordinary Least Squares Estimates (OLS)*

The important issue of how to estimate the parameters  $b_0$  and  $b_1$  in equation (4.4) we need a sample from the population. Let  $\{(x_i, y_i): i=1, \dots, n\}$  denote a random sample of size  $n$  from the population. Since these data come from (4.4), we can write

$$Y_i = b_0 + b_1x_i + u_i \quad (4.6)$$

Where  $u_i$  is the error term for observation  $i$  since it contains all factors affecting  $y_i$  other than  $x_i$ . As long as the intercept  $b_0$  is included in the equation, nothing is lost by assuming that the average value of  $u$  in the population is zero.

$$E(u) = 0. \quad (4.7)$$

Then:

$$\hat{b}_0 = \bar{y} - \hat{b}_1\bar{x} \quad (4.8)$$

And

$$\hat{b}_1 = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^n (x_i - \bar{x})^2} \quad (4.9)$$

### **4.1.3 The Multiple Regression Model**

Multiple regression analysis is more amenable to analysis because it allows us to control for many other factors which simultaneously affect the dependent variable. This is important both for testing economic theories and for evaluating policy effects when we must rely on non experimental data, and multiple regression models can accommodate many explanatory variables that may be correlated. Naturally, adding more factors to our model that are useful for explaining  $y$ , then more of the variation in  $y$  can be explained. Thus, multiple regression analysis can be used to build better models for predicting the dependent variable. In addition, multiple regression analysis it can incorporate fairly general functional form relationships. In the simple regression model, only one function of a single explanatory variable can appear in the equation, but the multiple regression models allows for much more flexibility, Stock and Watson (2008) .

#### **4.1.3.1 The Model with $k$ Independent Variables**

Multiple regression analysis allows many observed factors to affect  $y$ . In the export example, we might also include labor productivity (LP), real wages (LW), exchange rate of currency (ER), and Gross Domestic Product (GDP). The general multiple linear regression model (also called the multiple regression model) can be written in the population as:

$$y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_kx_k + u \quad (4.10)$$

Where  $b_0$  is the intercept,  $b_1$  is the parameter associated with  $x_1$ ,  $b_2$  is the parameter associated with  $x_2$ , and so on. Since there are  $k$  independent variables and an intercept, equation (4.10) contains  $k+1$  (unknown) population parameters. In the general case with  $k$  independent variables, we estimate  $\hat{b}_0, \hat{b}_1, \dots, \hat{b}_k$  in the equation:

$$\hat{y} = \hat{b}_0 + \hat{b}_1x_1 + \hat{b}_2x_2 + \dots + \hat{b}_kx_k. \quad (4.11)$$

The OLS estimates,  $k+1$  of them, are chosen to minimize the sum of squared residuals.

#### 4.1.3.2 Interpreting the OLS Regression Equation

For the computation of the estimated equation, we discuss the case of more than two independent variables, The OLS regression line is Wooldridge (2003):

$$\hat{y} = \hat{b}_0 + \hat{b}_1x_1 + \hat{b}_2x_2 + \dots + \hat{b}_kx_k.$$

The intercept  $\hat{b}_0$  in equation (4.11) is the predicted value of  $y$  when  $x_1 = 0$  and  $x_2 = 0$ . Sometimes setting  $x_1$  and  $x_2$  both equal to zero is an interesting scenario, but in other cases it will not make sense. Nevertheless, the intercept is always needed to obtain a prediction of  $y$  from the OLS regression line.

#### 4.1.4 **Statistical and Econometric Tests for the Estimated Functions:**

After specification and estimation stage in building econometric model, comes the testing stage for the coefficients. Therefore; there would be an examination to evaluate the accuracy of the variable's coefficient, using statistical and econometric methods. This is necessary to ensure that the values obtained through statistical and econometric methods, represents the real value in their community or not. There are two assumptions represent this evaluation, Talb (1991).

The principal used to determine the deviation value of coefficients from its original value is ordinary least square (OLS), which uses partial derivation to differentiate between estimated values, also equalizing the results to zero. In doing so, the least square of summed deviation for estimated and real value can be obtained. The variation can be obtained as below, Wooldridge (2003):

$$Var (\hat{b}) = S^2 (X'X)^{-1} \quad (4.12)$$

From above we obtain Standard Error of Estimation of the equation, via dividing the square of summed deviation by numbers of degree of freedom as follow:

$$S^2 = \frac{\sum_{i=1}^n e_i^2}{n-k} \quad (4.13)$$

Where  $n$  represents the size of sample and  $k$  represents the number of the variables in the model. The partial derivative for standard error of each coefficient will be taken as below:

$$S\hat{b}_R = \sqrt{\frac{S^2}{\sum_{i=1}^n R^2}} \quad , \quad S\hat{b}_A = \sqrt{\frac{S^2}{\sum_{i=1}^n A_i}} \quad (4.14)$$

From this other statistical testing can be done.

**T – Test:**

By using T-test the statistical credibility of each coefficient can be informed singularly, In other words; knowing the statistical significance of each independent variable on dependent variable. From testing two important hypotheses (Dominic, 1982):

A: Null – Hypotheses:  $H_0 : b = 0$

This assumes no relationship between dependent and independent variables.

B: Alternative – Hypotheses:  $H_1 : b \neq 0$

The t value can be obtained as follow:

$$t = \frac{\hat{b}}{S\hat{b}} \quad (4.15)$$

Through number of degree of freedom we derive schedule (t), and we compared with accounted (t). If the value of accounted (t) is bigger than scheduled (t), we deny null – hypotheses and accept the alternative-hypotheses. If the value of accounted (t) is smaller than scheduled (t), then we accept null-hypotheses and refuse the model. In other words, as the value of standard error decreases, the accounted (t) value should increase, Studemanmund (2006).

***Coefficient of determination – testing  $R^2$ :***

This test is used to distinguish the important explanatory variables from those of little significance, such as variables with sudden effect on the dependent variable. The coefficient of determination value is lying between zero and one ( $0 \leq R^2 \leq 1$ ).

If  $R^2 = 1$  this means that the independent variables explain and illustrate all changes happened in dependent variables but this is very rare case. And if the value of  $R^2 = 0$  this indicates that the independent variable does not explain and has no effect on the changes in the dependent variable, this is rare too. In general the highest the value of ( $R^2$ ) or the closer to one (1), the stronger is the explanatory power of the estimated function, and vice versa. The deviation between the real value of the samples and its maiden is called total deviation, and by summing them we can derive the sum square total of the deviation, (Abdulkarim, 1985):

$$SST = \sum_{i=1}^n (Y_i - \bar{Y})^2 \quad (4.16)$$

The variation equation will show the variation between the real value of the samples and estimated value, called sum square of the unexplained variation:

$$SSU = \sum_{i=1}^n (Y_i - \hat{Y})^2 \quad (4.17)$$

But the variation between estimated value and its maiden (after been summed and powered by two), called the sum of explained variation:

$$SSE = \sum_{i=1}^n (\bar{Y}_i - \hat{Y})^2 \quad (4.18)$$

We conclude that:

$$SST = SSE + SSU \quad (4.19)$$

By dividing both sides by SST:

$$1 = R^2 + \frac{SSU}{SST} \rightarrow R^2 = 1 - \frac{SSU}{SST} \quad (4.20)$$

Taking degree of freedom into account, the number of degree of freedom decline as we add more independent variables into the model, then we get the adjusted coefficient of determination:

$$\bar{R}^2 = R^2 = \frac{n-1}{n-k}(1-R^2) \quad (4.21)$$

This demonstrates what the added variables supplements of changes will be larger than decline of the degree of freedom, and these extra variables will be significance and not excessive.

**F – Test:**

This test will compare between the explanatory variation and non-explanatory variation, James and Mark (2006):

$$F = \frac{R^2 / (k - 1)}{(1 - R^2) / (n - k)} \tag{4.22}$$

This test is using to know the significance of estimated function, also it can be used to test two hypotheses; null-hypotheses, which illustrates the real value of coefficients are equivalent and equal to zero. In other words, these independent variables have no significance effect on dependent variable. Thus the F – test is used to examine coefficient of determination ( $R^2$ ), in null-hypotheses ( $R^2 = 0$ ). But the alternative hypotheses refers that the real value of the coefficients are not equal to zero, or the independent variables together have an significance effect on dependent variables. This means  $R^2 \neq 0$ . The scheduled F value can be obtained throughout special tables depending on degree of freedom ( $k - 1$ ), ( $n - k$ ), then we compare between the accounted (F) and scheduled (F), here; if the value of accounted F larger than scheduled F, then we accept alternative hypotheses and refuse null-hypotheses, and vice versa.

These Testing comes first to explain and illustrate the range of dependency for model’s estimated coefficients statistically. And the econometric theory will illustrate us other testing of second degree to distinguish the majority hypotheses of econometric model, is it accomplished or not? Then we use it to reveal the probability of existence of economic measures problem, from the probability of not existence, in the study which is:

**The (D.W) Test: Durbin Watson – test**

This test is used to inform the existence of autocorrelation problem or not among random variables on primary degree. Again by this test, the two hypotheses will be examined. The null-hypotheses which inform no relationship between ( $e_t - 1$ ,  $e_t$ ), in reverse to alternative hypotheses which shows, Studenmund (2006):

$$e_t = f(e_t - 1)$$

To test these two hypotheses, we calculate (D.W) as follow:

$$D.W = \frac{\sum_{t=2}^n (e_t - e_{t-1})^2}{\sum_{t=1}^n e_t^2} \quad (4.23)$$

After calculating the value of (D. W) we will compare it with (du, dl) scheduled, to judge of existence or not existence autocorrelation problem, the (dl) would be the lowest value, and (du) the highest as follow:

If: $D. W < dl$	→	positive autocorrelation
If: $dl \leq D. W \leq du$	→	test not definitive
If: $du \leq D.W \leq 4 - du$	→	no autocorrelation
If: $4 - du \leq D.W \leq 4 - dl$	→	test not definitive
If: $4 \leq D. W \leq 4 - dl$	→	negative autocorrelation

The values will be between ( $0 \leq D.W \leq 4$ ).

## ***4.2 Input-Output as a Simple Econometric Model for analyzing Foreign Trade***

An input-output analyze is a model of the interindustry relationships in an economy. The structure of input-output table is a matrix that lists economic sectors, in the same sequence, both vertically and horizontally. On the left-hand side of the table, each row is preceded by the name of a sector; the numbers appearing to the right show where and in what quantity the sector's output is dispersed. Across the top of the table, each column is headed by a sector's name; the numbers appearing below the column heading show whence and in what quantity that sector derives its inputs. Thus, any sector can be analyzed in terms of the direction and amount of its production or the origin and amount of its intake. In the first input-output study Wassily Leontief (1936) presented the so-called closed model in which all outputs are also used as inputs, industries produce commodities using commodities as well as factor inputs. Perhaps an even more striking and unexpected application was that to international trade. Input-output analyze approach to international trade is in the tradition of computable general equilibrium modeling; the key assumption of competitive analysis is that producers make decisions on the basis of the prices of the inputs and the outputs. Competitive analysis ought to explain the trade in goods and services between national economies on the basis of the so-called "fundamentals": the endowments, the technologies, and the preferences of the consumers, Thijs (2005).



#### 4.2.1 Input-output basics

Fundamentals of input-output analysis are a matrix of technical coefficients that summarizes the interdependencies between the sectors of production. To produce output, sectors require each other's inputs. The aim is the net output of an economy, taking into account the intermediate input requirements. Traditional input-output analysis is characterized by two simplifying assumptions. First, a common classification is used for commodities and production units: The economy is classified by sectors; second, sectors may have a variety of commodities as inputs, their outputs are not mixed. Each sector is identified with the commodity that it produces. By definition, a technical coefficient measures the requirement of some input per unit of some output, Dietzenbacher (1995). In this work our analyses concentrated on foreign trade in Czech Republic as an output both imports and exports, while inputs are sector shares and commodity shares to imports and exports. For using this tool of analyze it is necessary to understand the linear algebra behind it, for this purpose we illustrate this simple example:

The technology matrix A will describe the relations a sector has with all the other sectors. The technology matrix A will be a matrix such that each column vector represents a different industry and each corresponding row vector represents what that industry inputs as a commodity into the column industry. The technology matrix A below represents the relationships between the industries of Farming, Construction, and Clothing.

$$A = \begin{matrix} & \text{Farming} & \text{Construction} & \text{Clothing} \\ \begin{matrix} \text{Farming} \\ \text{Construction} \\ \text{Clothing} \end{matrix} & \begin{pmatrix} 0.25 & 0.24 & 0.08 \\ 0.15 & 0.05 & 0.08 \\ 0.10 & 0.18 & 0.04 \end{pmatrix} \end{matrix}$$

The relationships between the three industries in example are as follows.

1. The entry  $a_{11}$  holds the number of units the farmer uses of his own product in producing one more unit of farming. The entry  $a_{21}$  holds the number of units the farmer needs of construction to produce one more unit of farming. The entry  $a_{31}$  holds the number of units the farmer needs of clothing to produce one more unit of farming.
2. The entry  $a_{12}$  holds the number of units that the builder needs from the farmer to produce one more unit of building. The entry  $a_{22}$  holds the number of units the builder

needs of construction to produce one more unit of construction. The entry  $a_{32}$  holds the number of units the builder needs of clothing to produce one more unit of construction.

3. The entry  $a_{13}$  holds the number of units of farming that the tailor needs to produce one more unit of clothing. The entry  $a_{23}$  holds the number of units of construction that the tailor needs to produce one more unit of clothing. The entry  $a_{33}$  holds the number of units of clothing that the tailor needs to produce one more unit of his own product.

In general each entry in the technology matrix is represented as  $a_{ij} = X_{ij} / X_j$  where  $x_j$  represents the physical output of sector  $j$  in our example the total production of an industry. Finally  $X_{ij}$  represents the amount of the product of sector  $i$  the row industry needed as input to sector  $j$  the column industry, Jensen (2001).

#### **4.2.2 Input-output tables for foreign trade**

IO techniques have many applications such as economic impact analysis (*i.e.* measuring the impact of a change in the sectoral final demand on the production, income, value added or employment of economic sectors) measuring various backward and forward linkage indices, employment creation, income distribution. In addition, analyzing the effective rate of protection, project appraisal, cost-benefit analysis, regional planning, energy analysis, and price-quantity relationships, Valadkhani (2003). In the input-output analysis of the Czech economy we mainly use first; input-output table for describing the foreign trade in the Czech Republic from 1999 to 2008.

Table (18) shows exports and imports in Czech Republic as a final production in the economy, by using sector shears in both exports and imports as inputs for this production. Sectors are starting with 'Food and live animals' taking (0) code and ending with sector 'Commodities and transactions' taking code number (9) in the SITC<sup>10</sup> system of classification. Second, we use input-output table for describing the foreign trade in the Czech Republic from 1999 to 2008 for both exports and imports by commodity.

---

<sup>10</sup> The Standard International Trade Classification published by the UN. It has a hierarchical structure broken down to 5 levels of numerical codes. The levels are identified as SITC1 to SITC5

**Table 18: Foreign trade by sectors in the Czech Republic for years 2007, 2008**

Code	Sectors	Year 2007		Year 2008	
		Exports %	Imports %	Exports %	Imports %
0	Food and live animals	2.7	4.3	3.1	4.4
1	Beverages and tobacco	0.5	0.6	0.7	0.5
2	Crude materials, inedible, except fuels	2.5	2.4	2.6	2.7
3	Mineral fuels, lubricants and related materials	2.6	8.0	2.4	10.4
4	Animal and vegetable oils, fats and waxes	0.7	0.1	0.2	0.2
5	Chemicals and related products, n.e.s.	5.7	10.4	6.4	10.2
6	Manufactured goods classified by material	20.1	20.9	19.9	19.7
7	Machinery and transport equipment	54.1	43.0	53.6	41.4
8	Miscellaneous manufactured articles	10.8	10.2	10.7	10.4
9	Commodities and transactions in the SITC	0.3	0.1	0.40	0.1
<b>Total</b>		100	100	100	100

Source: export and import percentages calculated by the author, original data from CZSO database.

Art, collector's pieces and antiques' taking code number (97) in the Harmonised System (HS)<sup>11</sup> of classification. commodities starting with 'live animals' taking code (01) and ending with 'Works of art, collector's pieces and antiques' taking code number (97) in the Harmonised System (HS)<sup>12</sup> of classification.

<sup>11</sup>:The Harmonised Commodity Description and Coding System is an international commodity classification divided into chapters identified as HS2 (2-digit numerical codes). These chapters are broken down into headings called HS4 (4-digit numerical codes), which further divide into sub-headings called HS6 (6-digit numerical codes).

<sup>12</sup>:The Harmonised Commodity Description and Coding System is an international commodity classification divided into chapters identified as HS2 (2-digit numerical codes). These chapters are broken down into headings called HS4 (4-digit numerical codes), which further divide into sub-headings called HS6 (6-digit numerical codes).

## 5 Integrating Econometric Methods and Input-Output Model to Analyze Transition Impact on Foreign Trade in the Czech Republic (Empirical Framework)

### 5.1 *Econometric analysis*

In the Econometric analysis of The Czech foreign trade, the empirical results discussed in the following section in three parts; the first part will discuss the overall effect of selected macroeconomic variables on foreign trade both (Exports and Imports) in the Czech Republic for the period of 1993 to 2008. The method used is Multiple Regression Analysis to estimate the relationship between dependent variables (Exports and Imports) and independent variables (GDP, FDI, WAGES UNEMPLOYMENT, EMPLOYMENT, EXCHANGE RATE, PRODUCTIVITY and INFLATION RATE). For the one-equation models, the ordinary least squares method used to obtain estimates of the regression parameters.

A great number of regression estimates conducted in an attempt to find the most suitable value for explanatory and dependent variables. Furthermore, statistical program (MINITAB) version 13 used to verify several estimates for example; **F-Test** to explain the significance of estimated function, also it can be used to test two hypotheses (null-hypotheses which illustrates the real value of coefficients are equivalent and equal to zero) and (alternative hypotheses refers that the real value of the coefficients are not equal to zero, or the independent variables together have an significance effect on dependent variables. **T- Test** to explain the statistical credibility of each coefficient singularly or knowing the statistical significance of each independent variable on dependent variable. **R<sup>2</sup>-Test** used to distinguish the important explanatory variables from those of little significance, such as variables with sudden effect on the dependent variable, and the coefficient of determination value is lying between zero and one ( $0 \leq R^2 \leq 1$ ). **D.W-Test** is used to inform the existence of significant correlation in which they occur in our data file or not among random variables on primary degree. Again by this test, the two hypotheses will be examined. The null-hypotheses which inform no relationship between (et-1, et), in reverse to alternative hypotheses.

The second part will present and discuss Input-Output analyze as a Simple Econometric Model for analyzing Exports and Imports in the Czech Republic by using sector shears in both exports and imports for the period of 1999 to 2008. Sectors are starting with

(Food and live animals; Beverages and tobacco; Crude materials, inedible, except fuels; Mineral fuels, lubricants and related materials; Animal and vegetable oils, fats and waxes; Chemicals and related products; Manufactured goods classified chiefly by material; Machinery and transport equipment; Miscellaneous manufactured articles and Commodities and transactions) in the SITC system of classification. The final part will discuss foreign trade by commodities, in this part 97 commodities are accounted starting with live animals (code 01) and ending with Works of art, collectors pieces and antiques (code 97) showed in the table 1 in the Appendix. In addition, these commodities are contributing to exports and imports for the period of 1999 to 2008 in the Harmonised System (HS) of classification.

## ***5.2 Regression Analysis of Exports***

The analyze of Czech exports distributed into three parts; the first part discuss the relationship between exports and selected macroeconomic variables which illustrated in table 19, in other word, which macroeconomic variable have more impact on exports rather than others, more than 10 regression estimates conducted in an attempt to find the most suitable macro explanatory variable for exports. The second part will discuss the sector shares of exports in the Czech economy for the period of 1999 to 2008. In this part Czech economy distributed into 10 sectors, starting with food and live animals and ending with Commodities and transactions. In addition, explaining which sector taking a big share of exports during that period, and then arranging all sectors depending on their contribution of exports. The final part will present Czech exports by commodity for the period of 1999 to 2008 and shows which commodity taking a big share of exports during that period by arranging all commodities depending on their contributions of exports.

**Table 19: Macroeconomic Indicators and Foreign Trade in the Czech Republic from 1993 to 2008<sup>13</sup>**

years	Ex	IM	GDP	FDI	LW	UR	ER	EC	LR	IR
1993	146212.4	157621.5	1020000.3	19050	5904	4.4	5056000	29.15	-1.6	20.8
1994	163264.5	177799.8	1056000.7	24994	7004	4.3	5111000	28.78	2.1	10
1995	201694	223306.5	1466000.5	67993	8307	4.1	5148000	26.54	4	9.1
1996	217294.1	251586.7	1683000.3	38775	9825	3.9	5195000	27.14	3	8.8
1997	271124.8	290910.8	1811000.1	41251	10802	4.8	5205000	31.7	-1	8.5
1998	257458.5	278552.5	1996000.5	119969	11801	6.4	5125000	32.28	0.4	10.7
1999	310265.9	334475	2080000.8	218812	12797	8.6	4949000	34.57	4.2	2.1
2000	384807.2	416283.3	2189000.2	192421	13614	8.7	4940000	38.6	3.5	3.9
2001	398192.8	419985.8	2352000.2	214585	14793	8	4963000	38.1	6.5	4.7
2002	383962.7	413355.1	2464000.4	277689	15866	7.3	4991000	32.74	2.3	1.8
2003	422545	453456	2577000.1	59316	16917	7.8	4923000	28.21	5.3	0.1
2004	525751.9	530085.5	2814000.8	127844	18041	8.3	4940000	25.7	3.3	2.8
2005	579122.7	566834.9	2984000	279181	18992	7.9	4992000	23.96	4.3	1.9
2006	672123.8	650480.2	3222000.4	135948	20207	7.2	5072000	22.6	5.2	2.5
2007	748684.3	710866.9	3535000.5	185274	21692	5.3	5207000	20.29	3.7	2.8
2008	664212.8	652919.7	3696000.4	182976	22531	5.5	5268000	19.35	1.6	6.3

Sources: CZSO, OECD, CNB, ministry of labour and social affairs in CR, ministry of finance in CR, Economy

Watch, economy, investment and Finance Reports, for more information see <http://www.economywatch.com/economic-statistics/country/Czech-Republic>.

<sup>13</sup> exports refer to annual export of goods and services, Imports of goods and services, inflow of FDI, nominal wages in current prices, unemployment rate as a percentage of civilian labour force, total employment as a thousands of persons engaged, exchange rate as national currency units per US dollar, Inflation (average consumer price index change %).

**Table 20: Discription of the Variables**

<b>Abbreviation</b>	<b>variables</b>	<b>Discription of the variables</b>
<b>Ex</b>	<b>EXPORTS</b>	Czech Total Export of Goods and Services/ mill.CZK
<b>IM</b>	<b>IMPORTS</b>	Czech Total Import of Goods and Services / mill.CZK
<b>GD</b>	<b>GDP</b>	Czech Gross Domestic Product/ mill.CZK
<b>FD</b>	<b>FDI</b>	Czech Inflow of Foreign Direct Investment/ mill.CZK
<b>LW</b>	<b>WAGES</b>	Czech Nominal Wages at current Price/CZK
<b>UR</b>	<b>UNEMPLOYMENT</b>	Czech Unemployment Rate/As a Percentage of Civilian Labour Force
<b>ER</b>	<b>EMPLOYMENT</b>	Czech Total Employment / Thouthands of Persons Engaged
<b>EC</b>	<b>EXCHANGE RATE</b>	Czech Exchange Rate/National Currency Units per US dollar
<b>LR</b>	<b>PRODUCTIVITY</b>	Czech Labour productivity growth/% y/y
<b>IR</b>	<b>INFLATION</b>	Czech Inflation rate

Source: author's own abbreviations

### **5.2.1 Exports and Macroeconomic Variables**

In the regression analysis of both exports and imports we are facing the problem of measurement of the data that we are using for testing the export and import as an independent variables with dependent variables. Because for example, exports is in millions of dollar and; employment is measured in thaouthands of workers; Unemployment Rate is measured as a Percentage of Civilian Labour Force; Exchange Rate is measured as a National Currency Units per US dollar; Labour productivity is measured year by year growth rate and the inflation is measured by percentage increases in the level of the price from year to yaer. These measurements are diffirent and the regression model didn't show the actual relationship between both independent variables( exports and imports) and the dependent variables (macroeconomic variables), as it is shown in the appendix all the regression estimates of exports and imports using the real data in table 15. That is why we used the staddarization method for the real data to extract this effect and to distinguish the important explanatory variables from those of little significance. Furthermore, a great number of regression estimates conducted in an attempt to find the most suitable value for explanatory and dependent variables.

Standarization is a comparison of various measures of the normal distribution: standard deviations, cumulative percentages and Z-scores.In statistics, a standard score indicates how many standard deviations an observation is above or below the mean. It is a dimensionless quantity derived by subtracting the population mean from an individual raw score and then dividing the difference by the population standard deviation. This conversion process is called standardizing. The standard deviation is the unit of

measurement of the z-score. It allows comparison of observations from different normal distributions, which is done frequently in many researchs. The standard score is:

$$Z = \frac{C - m}{S}$$

Where is:

$X$  is a raw score to be standardized;

$\mu$  is the mean of the population;

$\sigma$  is the standard deviation of the population.

The quantity  $Z$  represents the distance between the raw score and the population mean in units of the standard deviation.  $Z$  is negative when the raw score is below the mean, positive when above. The use of  $Z$ -scores is not immediately as a test statistic for a significance test, but rather as a numerical guide to finding subsets of data which might show different trends than others. Table 21 shows the standarization of real data which illustrated in table 19 excluding the column of import to be standarized also with the macrovariables together in the regression analysis of imports, Desanto and Totoro(2008).

**Table 21: Standarized table of Exports and Macroeconomic Indicators in the Czech Republic from 1993 to 2008**

Ex	GDP	FDI	LW	UR	ER	EC	LR	IR
-1.30525	-1.59353	-1.33315	-1.62192	-1.1396	-0.10319	0.07291	-2.03138	2.84152
-1.21638	-1.54903	-1.26576	-1.40989	-1.19641	0.37727	0.00839	-0.37036	0.76095
-1.01611	-1.04219	-0.77822	-1.15873	-1.31001	0.70049	-0.3822	0.48259	0.58757
-0.93481	-0.77393	-1.10951	-0.86612	-1.42362	1.11107	-0.27758	0.03367	0.52977
-0.65427	-0.6157	-1.08143	-0.6778	-0.91239	1.19843	0.51756	-1.76202	0.47198
-0.72549	-0.38701	-0.18891	-0.48523	-0.00355	0.49957	0.6187	-1.13353	0.8958
-0.45029	-0.28317	0.9318	-0.29324	1.24611	-1.03791	1.01801	0.57238	-0.76095
-0.06182	-0.14842	0.63258	-0.13576	1.30291	-1.11653	1.72073	0.25813	-0.41419
0.00794	0.05308	0.88388	0.0915	0.90529	-0.91561	1.63355	1.6049	-0.26007
-0.06622	0.19153	1.59937	0.29833	0.50767	-0.67101	0.69891	-0.28058	-0.81874
0.13485	0.33122	-0.87661	0.50092	0.79169	-1.26504	-0.091	1.06619	-1.14624
0.6727	0.6242	-0.09962	0.71758	1.0757	-1.11653	-0.52868	0.16835	-0.6261
0.95084	0.83435	1.61628	0.90089	0.84849	-0.66228	-0.83209	0.61727	-0.79948
1.43551	1.12857	-0.00773	1.13509	0.45087	0.03658	-1.06923	1.0213	-0.68389
1.83451	1.5155	0.55154	1.42133	-0.62838	1.2159	-1.47203	0.34792	-0.6261
1.39429	1.71452	0.52549	1.58306	-0.51477	1.74878	-1.63594	-0.59482	0.04816

Source: the table standarized depending on the table 19



The general export model that will be used in our empirical tests can be expressed by these following equations:

**Regression Analysis: Ex versus GD; FD; LW; UR; ER; EC; LR; IR**

**The regression equation is:**

$$Ex = 0.0000 + 0.20 GDP + 0.016 FDI + 0.80 LW - 0.038 UR - 0.034 ER - 0.086 EC + 0.091 LR + 0.148 IR \quad (5.1)$$

**Table 22: Estimation of Equation (5.1), Regression Analysis of Exports and Macroeconomic Variables**

Predictor	Constant	GD	FD	LW	UR	ER	EC	LR	IR
Coefficient	0.0000	0.20	0.016	0.80	- 0.04	- 0.034	- 0.09	0.091	0.148
T-test	0.00	0.13	0.13	0.51	-0.1	-0.1	-0.5	0.70	0.78
F-test	22.81								
$R^2$	96.3%								
D.W	1.96								

The regression analysis of Czech exports in equation 5.1 shows that the exports depending on **GD; FD; LW; UR; ER; EC; LR; IR** Simultaneously. We have summarized the values of the main regression coefficients of Czech exports analysis in Table 21. The above model of Czech exports was able to explain **96.3** percent of the variation in Czech exports, which is a strong result. The signs of the coefficients for **GD; FD; LW; UR and LR** were correct, corresponding to the theoretical discussion of the export function. but the sign of **EC; IR and ER** did not correspond to theoretical expectations. Furthermore , in this case, their coefficients were statistically not significant. An interesting result was found with regard to **EC** which indicate the minus sign and it can be interpret this result by the nature of the exchange rate, even with the appreciation of Czech currency still Czech exports increased year-by-year, or even with the appreciation of Czech crown still Czech goods which exported cheaper than foreign goods specially for EU members. About the **ER** and depending on the real data in table 19 it can be seen there is no improvement in the number of employment to correspond the real increase in exports year by year, which means that the exports not depending on the number of employees but depending on the labor wages **LW**. That is quit normal results for the transition economies like Czech Republic, because many foreign companies are investing by **FDI** in the Czech Republic and they are using foreign

employee or skilled Czech employee and they are getting higher wages instead of unskilled Czech employee.

The **T-test** results are statistically not significant which shows that these independent variables separately not significant but all together explaining **96.3** of the variance of Czech exports. This results can be proved by **F-test** which shows that the accounted **F** is **22.81** which is greater than **F** scheduled (3.12). This means that we are accepting alternative hypotheses which refers that the real value of the coefficients are not equal to zero and independent variables together have a significance effect on dependent variables. In addition, the intercept is zero in this equation which indicate that without dependent variables exports should be zero, which is normal in our empirical work. The Durbin-Watson (D.W) statistic tests the residuals to determine if there is any significant correlation based on the order in which they occur in our data file. Since the D.W value is greater than **1.4**, there is probably not any serious autocorrelation in the residuals. The value of the **LW** (80 percent) and **GD** (20 percent) coefficients and their statistical significance indicate a strong correlation between Czech exports with **LW** and **GD**.

**Regression Analysis: Ex versus GD; FD; LW**

The regression equation is:

$$Ex = 0.0000 + 0.548 GDP + 0.0632 FDI + 0.467 LW \quad (5.2)$$

**Table 23: Estimation of Equation (5.2), Regression Analysis of Exports and Macroeconomic Variables**

Predictor	Constant	GD	FD	LW
Coefficient	0.00000	0.5478	0.06317	0.4666
T-test	0.00	0.82	0.77	0.505
F-test	78.37			
R <sup>2</sup>	95.1%			
D.W	1.18			

The regression analysis of Czech exports in equation 5.2 shows that the exports depending on **GD; FD and LW**. The values of the regression coefficients of the Czech exports summarized in Table 23; and shows that **95.1** percent of the variance of exports coming from **GD; FD and LW**. In addition, the signs of **GD; FD and LW** are corresponding with the theoretical framework and they have the positive sign, which means that the increase in these variables will lead to an increase in exports. Accounted **F** (78.37) is greater than the scheduled **F** (**4.08**) which illustrate that independent variables together have big impact on Czech exports. **T-test** results are statistically not

significant which shows that these independent variables separately not significant but all together significant as it is showed by F test.

**Regression Analysis: Ex versus GD**

**The regression equation is:**

$$\text{Ex} = 0.0000 + 0.974 \text{ GD} \quad (5.3)$$

$$R^2 = 94.8\% \quad \text{T-test}=15.95 \quad \text{D.W}=1.14$$

Equation (5.3) shows the relationship between export and Gross Domestic Product which is positive and corresponding with the theoretical part of the work. The R-Squared statistic indicates that the model as fitted explains 94.8 percent of the variability of exports. This result indicates that there is a strong relationship between exports and GDP because development of GDP it is coming from the improvement of most of the macrovariables such as increasing in the labor wages, productivity and quality of the goods produced in the economy. T-test as well prove the statistical significance of GDP coefficient which is 15.95 greater than T scheduled (6.31).

**Regression Analysis: Ex versus FDI**

**The regression equation is:**

$$\text{Ex} = 0.000 + 0.565 \text{ FDI} \quad (5.4)$$

$$R^2 = 32.0\% \quad \text{T-test}=2.56 \quad \text{D.W}=0.62$$

Equation (5.4) shows a positive relationship between exports and Foreign Direct investment but it is not significance depending on **T-test, which** are 2.56 smaller than T scheduled. This result is because of the fluctuations of the real data of **FDI** during the period of study which depending on the level of privatization of economic sectors in Czech Republic. For example, the amount of **FDI** in years 1995, 1996, 2002 and 2003 it was 67993, 38775, 59316 and 277689 Millions of CZK respectively, which means there are fluctuations in the amounts of **FDI** during the period of study and it can be proved by **D.W** test which illustrate that there is the autocorrelation problem with the data. In addition, the R-Squared statistic indicates that the model as fitted explains only 32 percent of the variability of exports by **FDI**.

**Regression Analysis: Ex versus LW**

**The regression equation is:**

$$\text{Ex} = 0.0000 + 0.972 \text{ LW} \quad (5.5)$$

$$R^2 = 94.6\% \quad \text{T-test}=15.61 \quad \text{D.W}=1.04$$

Equation (5.5) shows the relationship between exports and labor wages in the Czech Republic during the period of 1993 to 2008 and its sign as expected is positive. The T-

test shows the significance of this independent variable on exports and the R-Squared statistic as well explains 94.6 percent of the variance in exports by labor wages. This result interpret the strong relation between exports and labor wages, because the improvement of labor wages coming from the increase in productivity, and increasing in productivity will lead to increase in the exports as well.

**Regression Analysis: Ex versus UR**

**The regression equation is:**

$$\text{Ex} = 0.000 + 0.397 \text{ UR} \quad (5.6)$$

$$R^2 = 15.7\% \quad \text{T-test}=1.6 \text{ 0} \quad \text{D.W}=0.17$$

Equation (5.6) shows the positive relationship between exports and unemployment rate which positive and not corresponding with the economic theory as expected. Economic theory shows the negative relationship between exports and the rate of Unemployment, because decreasing in Unemployment means increases in the labor force and then increase in production and productivity as well, which finally lead to increase in exports as well. In contrast, this positive sign of unemployment can be interpret as a nature of Czech economy as a sample of transition economies, which affected by inflow of Foreign Direct Investment and their competition with domestic companies in the case of quality of the goods produced and the competition of the price as well. As a result many domestic companies crowded out of the market and the rate of Unemployment increased as it is shown in the table 19. For example, the rate of Unemployment in years 1993, 2000 and 2005 was 4.4, 7.9 and 8.7 percent respectively. In addition, R-Squared statistic as well explains only 15.7 percent of the variance in exports by Unemployment rate and T-test is not significance.

**Regression Analysis: Ex versus EC**

**The regression equation is:**

$$\text{Ex} = 0.000 - 0.568 \text{ EC} \quad (5.7)$$

$$R^2 = 32.3\% \quad \text{T-test}=-2.58 \quad \text{D.W}=0.24$$

Equation (5.7) shows the negative relationship between exports and exchange rate, which expected to be positive theoretically because, with the appreciation of Czech Currency, the Czech goods would be expensive in, compare with foreign goods. Although, this minus sign of exchange rate is interesting because it can be interpret by the nature of the exchange rate, even with the appreciation of Czech currency still

Czech exports increased year-by-year, or even with the appreciation of Czech crown still Czech goods which exported cheaper than foreign goods specially for EU members. In addition, exchange rate explain at least 32.3 percent of the variance of exports.

**Regression Analysis: Ex versus IR**

**The regression equation is:**

$$\mathbf{Ex = 0.000 - 0.644 IR} \qquad \qquad \qquad \mathbf{(5.8)}$$

$$\mathbf{R^2 = 41.5\%} \qquad \qquad \mathbf{T-test=-3.15} \qquad \qquad \mathbf{D.W=0.48}$$

Equation (5.8) shows the negative relationship between exports and inflation rate, which is, coincide with the expectations of this relationship. It can be explain in the way that a decreases in inflation rate means that there is a decrease in the price of goods produced in the Czech economy and then it should be more cheaper for the foreign market, and will lead to an increase in exports as well as. Furthermore, inflation rate explain 41.5 percent of the variance of exports as shown by R-squared test. However, the D.W test shows the problem of autocorrelation between year data of inflation rate.

Finally, experimenting with the data we determined those variables, which seem to be economically significant on exports during the period of 1993 to 2008. Although, we cannot monitor all variables, which affect the Czech Exports during, these periods and we deleted those variables that are not significant separately such as Employment rate and Labor productivity. In addition, the two significant variables, which have a big relationship with exports, are labor wages and gross domestic product.

**5.2.2 Exports by Sectors**

This part will present and discuss Exports in the Czech Republic by using sector shears for the period of 1999 to 2008. Sectors are starting with (Food and live animals; Beverages and tobacco; Crude materials, inedible, except fuels; Mineral fuels, lubricants and related materials; Animal and vegetable oils, fats and waxes; Chemicals and related products; Manufactured goods classified chiefly by material; Machinery and transport equipment; Miscellaneous manufactured articles and Commodities and transactions) in the SITC system of classification. Table 24 shows codes of the sectors in the Czech economy:

**Table 24: Codes of the Sectors in the Czech Economy**

<b>Codes</b>	<b>Sectors</b>
<b>0</b>	Food and live animals
<b>1</b>	Beverages and tobacco
<b>2</b>	Crude materials, inedible, except fuels
<b>3</b>	Mineral fuels, lubricants and related materials
<b>4</b>	Animal and vegetable oils, fats and waxes
<b>5</b>	Chemicals and related products
<b>6</b>	Manufactured goods classified chiefly by material
<b>7</b>	Machinery and transport equipment
<b>8</b>	Miscellaneous manufactured articles
<b>9</b>	Commodities and transactions in the SITC Classification

Source: CZSO External trade database

**Table 25: Czech Exports by Sectors from 1999 to 2008/ Mill.CZK**

	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>1999</b>	2471672	691724	3165051	2763636	80853	6008525	19467755	34535345	9820254	65685
<b>2000</b>	32998209	8395926	39565341	34246285	1253617	79596203	285138983	498401672	140486348	1016356
<b>2001</b>	34397577	8743866	38608489	38151687	1429670	81862002	309131509	599705881	154835568	1283006
<b>2002</b>	31135864	8557686	35093736	35952354	977884	74740961	294000341	622998225	149506736	1896414
<b>2003</b>	36398700	8193627	38421629	39434251	1004953	80579033	316410260	687200832	161509106	1777563
<b>2004</b>	47429746	8923857	47314618	49937627	1042826	103951385	388539970	876137606	198492304	887359
<b>2005</b>	61061935	10609211	47193113	57393486	1759457	118974531	406323755	949152489	215575314	542545
<b>2006</b>	61972373	10689074	54974991	61822426	1573745	129939273	445260227	1141747397	235930821	663058
<b>2007</b>	71873767	14457315	64864315	67542129	2042001	144162494	501110830	1343396028	268955472	829502
<b>2008</b>	77566820	16401290	64471776	84543322	2775883	145930142	482382148	1327412680	265283640	1310714

Source: CZSO External trade database

Table 26 shows Czech exports by sector shares from 1999 to 2008 starting with sectors of Food and live animals and ending with Commodities and transactions in the SITC Classification. Sector shares are different from sector to sector, and the biggest share is for Machinery and transport equipment, and the smallest share is for Commodities and transactions. This result shows the big improvement of the industrial sector in Czech republic especially the modernization of the firms' production equipment such as the Czech machine and automobile industry in the international business networks.

**Table 26: Czech Exports by Sector Shares from 1999 to 2008**

<b>Cods</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
<b>0</b>	3.126	2.943	2.712	2.481	2.655	2.753	3.268	2.890	2.899	3.143
<b>1</b>	0.875	0.749	0.689	0.682	0.598	0.518	0.568	0.498	0.583	0.665
<b>2</b>	4.003	3.529	3.044	2.797	2.803	2.747	2.526	2.563	2.616	2.612
<b>3</b>	3.495	3.055	3.008	2.865	2.876	2.899	3.071	2.883	2.724	3.425
<b>4</b>	0.102	0.112	0.113	0.078	0.073	0.061	0.094	0.073	0.082	0.112
<b>5</b>	7.599	7.100	6.455	5.956	5.878	6.034	6.367	6.059	5.815	5.913
<b>6</b>	24.621	25.434	24.377	23.429	23.080	22.555	21.745	20.762	20.212	19.545
<b>7</b>	43.677	44.457	47.290	49.647	50.127	50.860	50.795	53.239	54.186	53.783
<b>8</b>	12.420	12.531	12.210	11.914	11.781	11.522	11.537	11.001	10.848	10.749
<b>9</b>	0.083	0.091	0.101	0.151	0.130	0.052	0.029	0.031	0.033	0.053
<b>Total</b>	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Own Calculation depending on table 25

Table 27 shows Czech Exports by Sector shares and its Importance from 1999 to 2008. The first and the more important sector for the Czech exports during the period of study is Machinery and transport equipment. In year 1999, 43.7 percent of total exports come from this sector and in 2008 rose to 53.8 percent, which is more than half of the Czech exports during the period of 1999 to 2008. In this context we could take into consideration the dependence of exports of this sector, factors such as, for example, privatization followed by the modernization of the firms' production equipment, or the inclusion of the Czech machine and automobile industry in the international business networks, which results in greater cooperation in deliveries and subdeliveries for their own industrial production. An example of such cooperation is Volkswagen's investment into Skoda Mlada' Boleslav, where, after the merger with VW, this company started not only to modernize its assembly lines for the production of new cars but also to export many components to abroad.

**Table 27: Czech Exports by Sector Shares and it's Importance from 1999 to 2008**

<b>Cods</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
<b>7</b>	43.677	44.457	47.290	49.647	50.127	50.860	50.795	53.239	54.186	53.783
<b>6</b>	24.621	25.434	24.377	23.429	23.080	22.555	21.745	20.762	20.212	19.545
<b>8</b>	12.420	12.531	12.210	11.914	11.781	11.522	11.537	11.001	10.848	10.749
<b>5</b>	7.599	7.100	6.455	5.956	5.878	6.034	6.367	6.059	5.815	5.913
<b>2</b>	4.003	3.529	3.044	2.865	2.876	2.899	3.268	2.890	2.899	3.425
<b>3</b>	3.495	3.055	3.008	2.797	2.803	2.753	3.071	2.883	2.724	3.143
<b>0</b>	3.126	2.943	2.712	2.481	2.655	2.747	2.526	2.563	2.616	2.612
<b>1</b>	0.875	0.749	0.689	0.682	0.598	0.518	0.568	0.498	0.583	0.665
<b>4</b>	0.102	0.112	0.113	0.151	0.130	0.061	0.094	0.073	0.082	0.112
<b>9</b>	0.083	0.091	0.101	0.078	0.073	0.052	0.029	0.031	0.033	0.053
<b>Total</b>	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Own Calculation depending on table 25

The second important sector which contributed by 24.6 percent in 1999 and 19.5 percent in 2008 is Manufactured goods classified chiefly by material. Again this result prove a big development in industrial sector in Czech economy. The third important sector for exports in Czech economy during 1999 to 2008 is Miscellaneous manufactured articles which contributed by 12.4 percent in 1999 and 10.74 percent in 2008. The range of the rest of sectors and their importance in Czech exports it is as follows; Chemicals and related products; Crude materials, inedible, except fuels; Mineral fuels, lubricants and related materials; Food and live animals; Beverages and tobacco; Animal and vegetable oils, fats and waxes and Commodities and transactions in the SITC Classification.

### **5.2.3 Exports by commodity**

This part discuss Czech exports by commodities, in this part 97 commodities are accounted starting with live animals (code 01) and ending with Works of art, collectors pieces and antiques (code 97) showed in table 1 in the Appendix. In addition, these commodities are contributing to exports for the period of 1999 to 2008 in the Harmonised System (HS) of classification. The first and the more important commodity contributed in Czech exports during the period of study is (Nuclear reactors, boilers, machinery and mechanical appliances; parts, Code 84) which is shown in table 28. The amount of exports for this commodity is 2974686004 millions of CZK, and it is about 19 percent of total exports in the Czech Republic.



**Table 28: Czech Exports by the most important 10 Commodity Shears from 1999 to 2008**

<b>Cods</b>	<b>Exports</b>	<b>Shares</b>
<b>84</b>	2974686004	18.8622
<b>87</b>	2541509282	16.1154
<b>85</b>	2466860175	15.6421
<b>73</b>	801179258	5.0802
<b>72</b>	587846164	3.7275
<b>39</b>	542915227	3.4426
<b>94</b>	471420441	2.9892
<b>27</b>	467002990	2.9612
<b>40</b>	375106948	2.3785
<b>70</b>	348464354	2.2096

The second important commodity which contributes to czech exports during 1999 to 2008, is (Vehicles other than railway or tramway rolling-stock and parts and acc, code 87). This result explain the fact that there is a big improvement in transportation sector in Czech economy and the improvement in Czech exports to abroad, because after the satisfaction of all needs of trasportation sector we can export railway or tramway rolling-stock and parts of them. The third important commodity contributes to Czech exports is (Electrical machinery and equipment and parts thereof; sound recorders, code 85). All the three commodity related to machinery sector as we showed in the part of export sector which is (Machinery and transport equipment). The rest of more important commodities that contributed in Czech exports during 1999 to 2008 it is as follows: Articles of iron or steel, code 73; Iron and steel, code 72; Plastics and articles thereof, code 39; Furniture; bedding, mattresses, mattress supports, cushions, code 94; Mineral fuels, mineral oils and products of their distillation, code 27; Rubber and articles thereof, code 40; Glass and glassware code 70.

### **5.3 Regression Analysis of Imports**

The analyze of Czech imports distributed into three parts; the first part discuss the relationship between imports and selected macroeconomic variables which illustrated in standardized table 29, in other word, which macroeconomic variable have more impact on imports rather than others, more than 10 regression estimates conducted in an attempt to find the most suitable macro explanatory variable for imports. The second part will discuss the sector shares of imports in the Czech economy for the period of

1999 to 2008. In this part Czech economy distributed into 10 sectors, starting with food and live animals and ending with Commodities and transactions. In addition, explaining which sector taking a big share of imports during that period, and then arranging all sectors depending on their contribution of imports. The final part will present Czech imports by commodity for the period of 1999 to 2008 and shows which commodity taking a big share of imports during that period by arranging all commodities depending on their contributions of imports.

### 5.3.1 Imports and Macroeconomic Variables

In this part macroeconomic variable used as an independent variables such as **GD; FD; LW; UR; ER; EC; LR; IR** with imports as dependent variable. a great number of regression estimates conducted in an attempt to find the most suitable value for explanatory and dependent variables from those of little significance.

**Table 29: Standardized table of Imports and Macroeconomic Indicators in the Czech Republic from 1993 to 2008**

IM	GDP	FDI	LW	UR	ER	EC	LR	IR
-1.42518	-1.59353	-1.33315	-1.62192	-1.1396	-0.10319	0.07291	-2.03138	2.84152
-1.31034	-1.54903	-1.26576	-1.40989	-1.19641	0.37727	0.00839	-0.37036	0.76095
-1.05134	-1.04219	-0.77822	-1.15873	-1.31001	0.70049	-0.3822	0.48259	0.58757
-0.89039	-0.77393	-1.10951	-0.86612	-1.42362	1.11107	-0.27758	0.03367	0.52977
-0.66658	-0.6157	-1.08143	-0.6778	-0.91239	1.19843	0.51756	-1.76202	0.47198
-0.73692	-0.38701	-0.18891	-0.48523	-0.00355	0.49957	0.6187	-1.13353	0.8958
-0.41864	-0.28317	0.9318	-0.29324	1.24611	-1.03791	1.01801	0.57238	-0.76095
0.04696	-0.14842	0.63258	-0.13576	1.30291	-1.11653	1.72073	0.25813	-0.41419
0.06803	0.05308	0.88388	0.0915	0.90529	-0.91561	1.63355	1.6049	-0.26007
0.03029	0.19153	1.59937	0.29833	0.50767	-0.67101	0.69891	-0.28058	-0.81874
0.25852	0.33122	-0.87661	0.50092	0.79169	-1.26504	-0.091	1.06619	-1.14624
0.69465	0.6242	-0.09962	0.71758	1.0757	-1.11653	-0.52868	0.16835	-0.6261
0.9038	0.83435	1.61628	0.90089	0.84849	-0.66228	-0.83209	0.61727	-0.79948
1.37986	1.12857	-0.00773	1.13509	0.45087	0.03658	-1.06923	1.0213	-0.68389
1.72354	1.5155	0.55154	1.42133	-0.62838	1.2159	-1.47203	0.34792	-0.6261
1.39374	1.71452	0.52549	1.58306	-0.51477	1.74878	-1.63594	-0.59482	0.04816

Source: the table standardized depending on the table 19

The general import model that will be used in our empirical tests can be expressed by these following equations:

**Regression Analysis: IM versus ; GD; FD; LW; UR; ER; EC; LR; IR**

**The regression equation is:**

$$\text{IM} = 0.0000 + 0.48 \text{ GDP} - 0.0135 \text{ FDI} + 0.58 \text{ LW} - 0.106 \text{ UR} - 0.101 \text{ ER} - 0.015 \text{ EC} + 0.071 \text{ LR} + 0.081 \text{ IR} \quad (5.9)$$

**Table 30: Estimation of Equation (5.9), Regression Analysis of Imports and Macroeconomic Variables**

<b>Predictor</b>	<b>Constant</b>	<b>GD</b>	<b>FD</b>	<b>LW</b>	<b>UR</b>	<b>ER</b>	<b>EC</b>	<b>LR</b>	<b>IR</b>
<b>Coefficient</b>	0.0000	0.48	- 0.02	0.58	- 0.11	- 0.10	- 0.02	0.071	0.081
<b>T-test</b>	0.00	0.36	-0.14	0.45	-0.34	-0.35	-0.11	0.66	0.52
<b>F-test</b>	33.88								
<b>R<sup>2</sup> adj</b>	97.5%								
<b>D.W</b>	1.96								

The regression analysis of Czech imports in equation 5.9 shows that the imports depending on **GD; FD; LW; UR; ER; EC; LR; IR** Simultaneously. We have summarized the values of the main regression coefficients of Czech import analysis in Table 30. The above model of Czech inports was able to explain **97.5** percent of the variation in Czech imports, which is a strong result. The signs of the coefficients for **GD; FD; LW; UR; LR; EC and IR** were correct, corresponding to the theoretical discussion of the export function. but the sign of **ER** did not correspond to theoretical expectations. Furthermore , in this case, the coefficient was statistically not significant. An interesting result was found with regard to **FD** which indicate the minus sign and it can be interpret this result by the nature of foreign direct investment in transition economies like Czech Republic, because foreign direct investment means opning more companies inside the country and production of more goods and services, which lead to the decrease of imported goods. Furthermore, we have tried to explain this negative relation by the possible overly optimistic impact of foreign direct investment on the economy, assuming that the foreign capital will support the production of domestic goods and services, which previously had to be imported and that such investments do not encourage imports. About **LW** and its cooefficient is significant, for example, 1 percent increaese in imports its caused bt 0.58 percent increase in labor wages I ech republic. In addition, as we illustrated in export part of this study, labor wages have been more significant in export regression as well, becaue by increasing the labor wages in Czech Republic means increasing the purchasing power for majority of the labor force in the society nad leading to an increaese in demand for goods, part of these goods can be impotrtd from abroad.

The **T-test** results are statistically not significant which shows that these independent variables seperatly not significant but all together explaining **97.5** of the variance of Czech impors. This results can be proved by **F-test** which shows that the accounted **F** is

**33.88** which is greater than **F** scheduled (3.12). This means that we are accepting alternative hypotheses which refers that the real value of the coefficients are not equal to zero and independent variables together have a significant effect on dependent variables. In addition, the intercept is zero in this equation which indicate that without dependent variables exports should be zero, which is normal in our empirical work. The Durbin-Watson (D.W) statistic, test the residuals to determine if there is any significant correlation based on the order in which they occur in our data file. Since the D.W value is greater than **1.4**, there is probably not any serious autocorrelation in the residuals. The value of the **LW** (58 percent) and **GD** (48 percent) coefficients and their statistical significance indicate a strong correlation between Czech imports with **LW** and **GD**.

**Regression Analysis: IM versus GD; FD; EC; LR**

The regression equation is:

$$\mathbf{IM = 0.0000 + 0.938 GDP - 0.0152 FDI - 0.0458 EC + 0.0721 LR} \quad (5.10)$$

**Table 31: Estimation of Equation (5.10), Regression Analysis of Imports and Macroeconomic Variables**

Predictor	Constant	GD	FD	EC	LR
Coefficient	0.00000	0.9380	-0.01517	-0.04577	0.07206
T-test	0.00	9.19	-0.18	0.07915	1.19
F-test	87.68				
$R^2$	97.0%				
D.W	1.68				

The regression analysis of Czech imports in equation 5.10 shows that the imports depending on **GD; FD; EC and LR**. The values of the regression coefficients of the Czech imports summarized in Table 31; and shows that **97** percent of the variance of imports coming from **GD; FD; EC and LR**. In addition, the signs of **GD; FD; EC** and **LR** are corresponding to the theoretical framework, which means that the increase in **GD** and **LR** will lead to an increase in imports. In contrast, the decrease in both **FD** and **EC** will lead to an increase in imports. Furthermore, the negative sign of Exchange rate can be interpret in the way that, the appreciation of Czech Currency against foreign currency means that the foreign goods should be more cheaper for Czech consumer and they demand more goods outside, which means increase in imports in the end. Accounted **F** (87.68) is greater than the scheduled **F** (**4.08**) which illustrate that independent variables together have big impact on Czech imports. **T-test** results are statistically not significant which shows that these independent variables separately not significant but all together significant as it is showed by **F** test. The (D.W) test shows

that there is no autocorrelation problem between data observations during the period of study.

**Regression Analysis: IM versus GD; LW; LR; IR**

The regression equation is:

$$IM = 0.0000 + 0.157 GDP + 0.883 LW + 0.0931 LR + 0.134 IR \quad (5.11)$$

**Table 32: Estimation of Equation (5.11), Regression Analysis of Imports and Macroeconomic Variables**

Predictor	Constant	GD	LW	LR	IR
Coefficient	0.00000	0.1568	0.8831	0.09314	0.1343
T-test	0.00	0.26	1.39	1.25	1.27
F-test	100.45				
$R^2$	97.3%				
D.W	2.02				

The regression analysis of Czech imports in equation 5.11 shows that the imports depending on **GD; LW; LR and IR**. The values of the regression coefficients of the Czech imports summarized in Table 32; and shows that **97.3** percent of the variance of imports coming from **GD; LW; LR and IR**. In addition, the signs of **these variables** are corresponding to the theoretical framework, which means that the increase in **these variables will** lead to an increase in imports. Furthermore, the coefficient of labor wages illustrate that, 1 percent increase in imports it is coming from the increase of labor wages by 0.88 percent of labor wages which is strong relationship between imports and labour wages. negative sign of Exchange rate can be interpret in the way that, the appreciation of Czech Currency against foreign currency means that the foreign goods should be more cheaper for Czech consumers and they demand more goods outside, which means increase in imports in the end. Accounted **F** (100.45) is grater than the scheduled **F** (**4.08**) which illustrate that independent variables together have big impact on Czech imports. **T-test** results are statistically not significant, because accounted T-tests smaller than T-scheduled, which shows that these independent variables seperatly not significant but all together significant as it is showed by **F** test. The (D.W) test shows that there is no autocorrelation problem between data observations during the period of study.

**Regression Analysis: IM versus GD; LW**

The regression equation is:

$$IM = 0.0000 + 0.350 GDP + 0.635 LW \quad (5.12)$$

**Table 33: Estimation of Equation (5.12), Regression Analysis of Imports and Macroeconomic Variables**

Predictor	Constant	GD	LW
Coefficient	0.00000	0.3501	0.6351
T-test	0.00	0.68	1.23
F-test	200.38		
$R^2$	96.9%		
D.W	1.39		

The regression analysis of Czech imports in equation 5.12 shows that the imports depending on **GD and LW**. The values of the regression coefficients of the Czech imports summarized in Table 33; and shows that **96.9** percent of the variance of imports coming from **GD and LW**. In addition, the signs of **these variables** are corresponding with the theoretical framework and they have the positive sign, which means that the increase in these variables will lead to an increase in imports. Accounted **F** (200.38) is greater than the scheduled **F (3.63)** which illustrate that independent variables together have big impact on Czech imports. **T-test** results are statistically not significant which shows that these independent variables separately not significant but all together significant as it is showed by **F** test. The Durbin-Watson (D.W) statistic tests the residuals to determine if there is any significant correlation based on the order in which they occur in our data file. Since the D.W value is greater than **1.25**, there is probably not any serious autocorrelation in the residuals

**Regression Analysis: IM versus GD**

**The regression equation is:**

$$\mathbf{IM = 0.0000 + 0.982 GDP} \quad (5.13)$$

$$\mathbf{R^2 = 96.5\% \quad T-test=19.62 \quad D.W=1.38}$$

Equation (5.13) shows the relationship between imports and Gross Domestic Product which is positive and corresponding with the theoretical part of the work. The R-Squared statistic indicates that the model as fitted explains 96.5 percent of the variability of imports. This result indicates that there is a strong relationship between imports and GDP because development of GDP it is coming from the improvement of most of the macrovariables such as increasing in the labor wages, productivity and quality of the goods produced in the economy. In addition, improvement in gross domestic product will need increase in imports of goods which they need for the process

of production. T-test as well prove the statistical significance of GDP coefficient which is **19.62** greater than T- scheduled (6.31).

### **Regression Analysis: IM versus LW**

**The regression equation is:**

$$\text{IM} = 0.0000 + 0.984 \text{ LW} \quad (5.14)$$

$$R^2 = 96.7\% \quad \text{T-test} = 20.40 \quad \text{D.W} = 1.35$$

Equation (5.14) shows the relationship between imports and labor wages in the Czech Republic during the period of 1993 to 2008 and its sign as expected is positive. In addition, labor wage coefficient shows that 1 percent increase in imports it caused by the increase in labor wages by 0.98 percentages; this result shows a strong relationship between imports and labor wages. The T-test shows the significance of this independent variable on imports and the R-Squared statistic as well explains 96.7 percent of the variance in imports by labor wages. This result interpret the strong relation between imports and labor wages as well, because the improvement of labor wages coming from the increase in productivity, and increasing in productivity will lead to increase in the imports as well.

Finally, experimenting with the data we determined those variables, which seem to be economically significant on imports during the period of 1993 to 2008. Although, we cannot monitor all variables, which affect the Czech imports during these periods and we deleted those variables that are not significant separately such as Employment rate; Labor productivity; inflation rate and unemployment rate. In addition, the two significant variables, which have a big relationship with imports, are labor wages and gross domestic product.

### **5.3.2 Imports by Sectors**

This part will present and discuss imports in the Czech Republic by using sector shears for the period of 1999 to 2008. Sectors are starting with (Food and live animals; Beverages and tobacco; Crude materials, inedible, except fuels; Mineral fuels, lubricants and related materials; Animal and vegetable oils, fats and waxes; Chemicals and related products; Manufactured goods classified chiefly by material; Machinery and transport equipment; Miscellaneous manufactured articles and Commodities and

transactions) in the SITC system of classification. Table 29 shows codes of the sectors in the Czech economy:

**Table 34 : Czech Imports by Sectors from 1999 to 2008/ Mill.CZK**

years	0	1	2	3	4	5	6	7	8	9
1999	4392325	737856	2844986	7958718	212055	10768243	18235175	39098910	11846221	29962
2000	50198838	7386292	39380865	119936556	2640127	139101744	257870520	496702715	128286894	419267
2001	53656554	7268045	40030442	125738844	3142443	151022196	280091225	584414394	139854558	345384
2002	54167867	6598492	38188766	100248121	3028175	148406308	272973990	561745090	140042426	271731
2003	57086800	7530015	40955961	107788563	3764028	164435368	289838053	616257956	152707663	358731
2004	72149704	10667512	52915546	122145778	4162110	194833362	360757377	739946498	190676213	841179
2005	81647879	11781284	51355543	167614361	3625968	201476142	374319057	736902547	199979232	1259837
2006	88991947	12991251	57316507	200790573	3726669	219095352	428545861	870733502	221503649	1117061
2007	102934058	15723144	58315742	191315518	3326962	248457905	500236880	1028045236	241653941	1309184
2008	104794112	12658421	64009370	249982842	4516188	245685930	473456879	992997365	250487352	2029102

Source: CZSO External trade database

Table 34 shows Czech exports by sector shares from 1999 to 2008 starting with sectors of Food and live animals and ending with Commodities and transactions in the SITC Classification. Sector shares are different from sector to sector, and the biggest share is for Machinery and transport equipment, and the smallest share is for Commodities and transactions. This result shows the big improvement of the industrial sector in Czech republic especially the modernization of the firms' production equipment such as the Czech machine and automobile industry in the international business networks. In addition, the improvement of this sector will lead to an increase in needs for the equipment and sparparts for machinery sector which lead in the end to an increase in imports.

**Table 35 : Czech Imports by Sector Shares from 1999 to 2008**

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
0	4.569	4.042	3.873	4.086	3.962	4.125	4.462	4.228	4.304	4.365
1	0.768	0.595	0.525	0.498	0.523	0.610	0.644	0.617	0.658	0.527
2	2.960	3.171	2.889	2.881	2.843	3.025	2.806	2.723	2.439	2.666
3	8.280	9.657	9.075	7.562	7.482	6.983	9.159	9.540	8.000	10.413
4	0.221	0.213	0.227	0.228	0.261	0.238	0.198	0.177	0.139	0.188
5	11.202	11.201	10.900	11.195	11.413	11.139	11.010	10.409	10.390	10.234
6	18.970	20.764	20.215	20.591	20.118	20.625	20.455	20.360	20.919	19.722
7	40.675	39.995	42.179	42.374	42.774	42.305	40.269	41.369	42.991	41.364
8	12.324	10.330	10.094	10.564	10.599	10.901	10.928	10.524	10.105	10.434
9	0.031	0.034	0.025	0.020	0.025	0.048	0.069	0.053	0.055	0.085
Total	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000

Source: Own Calculation depending on table 34



Table 35 shows Czech imports by Sector shares and it's Importance from 1999 to 2008. The first and the more important sector for the czech imports during the period of study is Machinery and transport equipment. in year 1999, 40.6 percent of total imports come from this sector and in 2008 rose to 41.3 percent, which is a big share of the Czech imports during the period of 1999 to 2008. In this context we could take into consideration the dependence of imports of this sector, factors such as, for example, privatization followed by the modernization of the firms' production equipment, or the inclusion of the Czech machine and automobile industry in the international business networks, which results in greater cooperation in deliveries and subdeliveries for their own industrial production. An example of such cooperation is Volkswagen's investment into Skoda Mlada' Boleslav, where, after the merger with VW, this company started not only to modernize its assembly lines for the production of new cars but also to import many components from abroad especially from Germany.

**Table 36: Czech Imports by Sector Shares and it's Importance from 1999 to 2008**

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
<b>7</b>	40.675	39.995	42.179	42.374	42.774	42.305	40.269	41.369	42.991	41.364
<b>6</b>	18.97	20.764	20.215	20.591	20.118	20.625	20.455	20.36	20.919	19.722
<b>8</b>	12.324	10.33	10.094	10.564	10.599	10.901	10.928	10.524	10.105	10.434
<b>5</b>	11.202	11.201	10.9	11.195	11.413	11.139	11.01	10.409	10.39	10.234
<b>3</b>	8.28	9.657	9.075	7.562	7.482	6.983	9.159	9.54	8.00	10.413
<b>0</b>	4.569	4.042	3.873	4.086	3.962	4.125	4.462	4.228	4.304	4.365
<b>2</b>	2.96	3.171	2.889	2.881	2.843	3.025	2.806	2.723	2.439	2.666
<b>1</b>	0.768	0.595	0.525	0.498	0.523	0.61	0.644	0.617	0.658	0.527
<b>4</b>	0.221	0.213	0.227	0.228	0.261	0.238	0.198	0.177	0.139	0.188
<b>9</b>	0.031	0.034	0.025	0.02	0.025	0.048	0.069	0.053	0.055	0.085
<b>Total</b>	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Own Calculation depending on table 34

The second important sector which contributed by 18.97 percent in 1999 and 19.722 percent in 2008 is Manufactured goods classified chiefly by material. Again this result prove a big development in industrial sector in Czech economy. The third important sector for imports in Czech economy during 1999 t0 2008 is Miscellaneous manufactured articles which contributed by 12.32 percent in 1999 and 10.43 percent in 2008. The range of the rest of sectors and their importance in Czech imports it is as follows; Chemicals and related products; Mineral fuels, lubricants and related materials; Food and live animals; Crude materials, inedible, except fuels; Beverages and tobacco;

Animal and vegetable oils, fats and waxes and Commodities and transactions in the SITC Classification.

### 5.3.3 Imports by commodity

This part present Czech imports by commodities, in this part 97 commodities are accounted starting with live animals (code 01) and ending with Works of art, collectors pieces and antiques (code 97) showed in table 1 in the Appendix. In addition, these commodities are contributing to imports for the period of 1999 to 2008 in the Harmonized System (HS) of classification. The first and the more important commodity contributed in Czech imports during the period of study is (Nuclear reactors, boilers, machinery and mechanical appliances; parts, Code 84) which is shown in table 32. The amount of imports for this commodity is 2708392883 millions of CZK, and it is about 16.968 percent of total imports in the Czech Republic during the period of study.

**Table 37: Czech imports by the most important 10 Commodity Shears from 1999 to 2008**

<b>Cods</b>	<b>Imports</b>	<b>Shares</b>
<b>84</b>	2708392883	16.968
<b>85</b>	2505183967	15.695
<b>27</b>	1394067700	8.734
<b>87</b>	1377228803	8.628
<b>39</b>	875338873	5.484
<b>72</b>	692536174	4.339
<b>73</b>	497357893	3.116
<b>30</b>	404202169	2.532
<b>90</b>	377876761	2.367
<b>48</b>	312105328	1.955

Source: own calculation depending on table

The second important commodity which contributes to czech imports during 1999 to 2008, is (Electrical machinery and equipment and parts thereof, code 85). This result explain the fact that there is a big improvement in machinery and equipment sector in Czech economy and the improvement in Czech imports from abroad.. The third important commodity contributes to Czech imports is (Mineral fuels, mineral oils and products of their distillation, code 27). All the three commodity related to machinery and industrial sector as we showed in the part of export sector which is (Machinery and transport equipment with Mineral fuels and mineral oils). The rest of the more important commodities that contributed in the Czech imports during 1999 to 2008, it is

as follows; (Vehicles other than railway or tramway rolling-stock and parts, code 87; Plastics and articles thereof, code 39; Iron and steel, code 72; Articles of iron or steel, code 73; Pharmaceutical products, code 30; Optical, photographic, cinematographic, measuring, checking, precision, code 90; Paper and paperboard; articles of paper pulp, of paper or of paper board, code 40).

## 6 Conclusion

1. The pre-war economic level of Czechoslovakia was quite comparable with such countries as Germany, France, Belgium and Austria. According to the statistical data on industrial production, before World War II Czechoslovakia was one of the ten industrialized countries in the world.
2. during the post-war period up to 1989, the allocation of resources through central planning rather than the market mechanism resulted in a long-term slowdown in productivity and the standard of living, as well as in the last 20 years of central planning in particular, Czechoslovakia's economic performance has been disappointing.
3. In 1989 the former Czechoslovakia had one of the smallest private sectors in the communist world, employing only about 1.2% of the labor force and producing a small fraction of the national output.
4. The considerable decline of the Czechoslovak economy during the eighties, as compared with the previous decade, is shown from table 1. The average annual growth rate of real GDP contracted from 4.8 to 1.5%. a similar slowdown occurred in other macroeconomic indicators including average wages, productivity of labour and productivity of fixed capital. On the other hand, inflation (expressed by the CPI) speed up.
5. since the beginning of the transformation the service sector has experienced the largest boom, especially in tourism sector. Services currently contribute to more than half of the GDP. The service sector has increased its share by more than 30% since 1991.
6. After the Economic stabilization, the transformation reforms were launched. The reform was important to increase the share of private ownership (state ownership is connected with low efficiency) via privatization and support for small and medium enterprises.
7. Before the transition process, the substantial percentage of Czech exports are resource-based, low value-added products and standard labour intensive and relatively low-skill manufactures. During the 1990s, foreign trade became a modest engine of growth, when Germany had replaced Russia as the main trading partner. The composition of Czech foreign trade has radically changed. The share in exports

of machinery and transport equipment has doubled since 1993, while raw materials and semi-finished products have shrunk in similar proportions, Svejnar (1995).

8. The economic transition in central and Eastern Europe (CEE) started in the early 1990's. The Czechoslovak (later Czech) government began the process of privatizing companies. Voucher privatization took place in Czech Republic in two waves. The first wave involved shares in 988 firms. The second included shares in an additional 676 firms plus unsold shares in 185 firms carried over from the first wave.
9. The transition economies implemented economic and political liberalization simultaneously. After 1989, state authorities regulated not only the economy, but also most of the activities in the society. The Czech Republic government liberalized almost all the prices, privatized most of the economy, decentralized the wage setting, and opened the country to the foreign trade with nearly balanced budget. In the Czech Republic liberalization index was 0.68 in years 1990/93 and 0.83 in years 1994/98 that is why there is improvement in economic growth during these two periods to be positive by 2.28 percent.
10. In general, the transition impact on economic performance in the Czech Republic was positive. For example, between 1996 and 2006 the GDP increased all of the years except year 1998; inflation slowed down from 8.8 in 1996 to 2.5 year 2006. Appreciation of Czech currency in camper with Euro even with the USD, and it is even not threatening the foreign trade as well. That means increasing in foreign trade and increasing the purchasing power for the domestic consumers as well; foreign trade have boosted both exports and imports during 1996 to 2006
11. In the beginning of the transition process in the Czech Republic, the regulation of prices, a subsequent increase of capital costs and a continuous decrease of real wages, become exports more labor-intensive and imports more capital-intensive.
12. After the accession of the Czech Republic to the EU on 1 May 2004, both export and import growth rates experienced an upswing during the accession period, especially the strengthen with the new Toyota-Peugeot-Citroen plant in Kolín having started production process.
13. In the Czech Republic FDI has been a main source of necessary investment for renewing the industrial structure, bringing modern technology, improving management skills, and improving the quality of the goods produced in the economy and then facilitating access to the international market competition.

14. The appreciation of Czech currency continues year-by-year does not affect negatively on the foreign trade, which is due to the comparative price of Czech goods and improvement in the quality of the goods, which exported especially to the EU members.
15. The most important determinants of Czech trade with the EU members are the level of aggregate demand, the real exchange rate, liberalization of tariffs and the evaluation of unit prices of exports and imports.
16. In the empirical work, the regression analysis of Czech exports shows that the exports depending on **GD; FD; LW; UR; ER; EC; LR; IR** Simultaneously. This model of Czech exports was able to explain **96.3** percent of the variation in Czech exports, which is a strong result. In addition, the two significant variables, which have a big relationship with exports, are labor wages and gross domestic product.
17. The first and the more important sector for the Czech exports during the period of study is Machinery and transport equipment. In year 1999, 43.7 percent of total exports come from this sector and in 2008 rose to 53.8 percent, which is more than half of the Czech exports during the period of 1999 to 2008.
18. The first and the more important commodity contributed in Czech exports during the period of study is (Nuclear reactors, boilers, machinery and mechanical appliances; parts, Code 84). The amount of exports for this commodity is 2974686004 millions of CZK, and it is about 19 percent of total exports in the Czech Republic
19. The regression analysis of Czech imports shows that the imports depending on **GD; FD; LW; UR; ER; EC; LR; IR** Simultaneously. This model of Czech imports was able to explain **97.5** percent of the variation in Czech imports, which is a strong result. In addition, the two significant variables, which have a big relationship with imports, are labor wages and gross domestic product.
20. The first and the more important sector for the Czech imports during the period of study is Machinery and transport equipment. In year 1999, 40.6 percent of total imports come from this sector and in 2008 rose to 41.3 percent, which is a big share of the Czech imports during the period of 1999 to 2008.
21. The first and the more important commodity contributed in Czech imports during the period of study is (Nuclear reactors, boilers, machinery and mechanical appliances; parts, Code 84). The amount of imports for this commodity is

2708392883 millions of CZK, and it is about 16.968 percent of total imports in the Czech Republic during 1999 to 2008.

## 7 References

- [1] ABDULKARIM, M. Econometric method for analyzing cement for the period of (1965- 1983), *Journal of economics, review* 26, Baghdad, 1985.
- [2] AIGINGER, K. PENEDER, M. and STANKOVSKY, J. The Explanatory Power of market-based Trade Theories for the trade between Market Economies and Reform Countries, *Emperica*, 21, 1994
- [3] AITKEN, B., HARRISON, A. Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela”, the *American Economic Review*, Vol. 89, No. 3, pp. 605-618, 1999.
- [4] HANOUSEK, J., MUNICH, D. “Czech Republic: Czech Year book, Prague: CERGE-EI, 2000.  
Analysis, December 15, 2001.
- [5] BADINGER, H. AND TONDL, G. Trade, Human Capital and Innovation: The Engines of European Regional Growth in the 1990s. Economic University, IEA, Vienna and the Austrian National Bank, 2002.
- [6] BALASSA, B. *New Directions in the World Economy*, London, the Macmillan Press Ltd, 1989.
- [7] BASU, S., ESTRIN, S. and SVEJNAR, J. Employment and Wage Behavior of Industrial Enterprises in Transition Economies; the Cases of Poland and Czechoslovakia, *Economics of Transition*, 5:2, pp. 271-287, 1997.
- [8] BASU, S., ESTRIN, S. and SVEJNAR, J. Employment and Wages in Enterprises under Communism and in Transition: Evidence from Central Europe and Russia, William Davidson Institute working paper No.114B, 2000.
- [9] BENÁČEK, V., PROKOP, L. AND VÍŠEK, J. Á. Determining Factors of the Czech Foreign Trade Balance: Structural Issues in Trade Creation, CNB Working Paper Series 3, 2003.
- [10] BENÁČEK, V., PROKOP, L. AND VÍŠEK, J. Á. Determining Factors of the Czech Foreign Trade Balance: Structural Issues in Trade Creation, Czech National Bank, Working Paper Series 3, 2005.
- [11] BENÁČEK, V., PROKOP, L. AND VÍŠEK, J. Á. Determining Factors of Czech Foreign Trade: A Cross-Section Time Series Perspective, CNB Working Paper Series 3, 2005.



- [12] BENÁČEK, V., PROKOP, L. AND VÍŠEK, J. Á. Determining Factors of the Czech Foreign Trade Balance: Structural Issues in Trade Creation, CNB Working Paper Series 3, 2003.
- [13] BENACEK, V. ZEMPLINEROVA, A. Foreign Direct Investment In The Czech Manufacturing Sector, Prague Economic Papers, University of Economics, Prague, vol. 2,1997.
- [14] BERG, A, BORENSZTEIN, E, SAHAY, R, and ZETTELMEYER, J. The Evolution of Output in Transition Economies: Explaining the Differences, Working Paper WP/99/73. Washington, DC: IMF, 1999.
- [15] BERG, A., SACHS, D. Structural adjustment and international trade in Eastern Europe: The case of Poland, Economic Policy 14, Pp.117–173, 1992.
- [16] BLAIKIE, H. Foreign Trade and Exchange Rate Development in the Czech and Slovak Republics since the Split, Global Business Environment, November 28, 2001.
- [17] BOERI, T. Structural Change, Welfare Systemes and Labor allocation, Oxford University Press, 2000.
- [18] BOHATA, M. FICHER, M. Performance of Manufacturing Industry During Transformation, Eastern European Economics, January-February 1995.
- [19] BORENSZTEIN, E., DEMEKAS, D. G., OSTRY, D. An empirical analysis of the output declines in three Eastern European countries, IMF Staff Papers 40, Pp.1–31, 1993.
- [20] BOWEN, H. LEAMER, E. and SVEIKAUSKAS, L. Multicountry and Multifactor Tests of the Factor Abundance Theory, American Economic Review, 77, September 1987.
- [21] BUCH, M. and HEINRICH P. The End of the Czech Miracle, Kiel Discussion Papers 301, June 1997.
- [22] CALVO, G., CORICELLI, F. Stabilising a previously centrally planned economy, Poland 1990. Economic Policy 14, Pp.176–226, 1992.
- [23] CERGE-EI, Czech Republic 1996: Basic Socio-Economic Indicators, 1996.
- [24] Czech National Bank.
- [25] Czech Republic 2008: Strong Currency, No Rush toward the Euro, CERGE-EI, 2008.
- [26] Czech Republic Statistical Office.

- [27] DE MELO, M, DENIZER, C, GELB, A, and TENEV, S. Circumstances and Choice: The Role of Initial Conditions and Policies in Transition Economies, World Bank Econ. Rev. 15, 1:1–31, Sept. 2001, pp 229-250.
- [28] DE MELO, M. CEVDET, D. ALAN, G. and STOYAN T. Circumstance and Choice: The Role of Initial Conditions and Policies in Transition Economies, World Bank Policy Research Paper, the World Bank, 1997.
- [29] DE MELO, M. CEVDET, D. and ALAN, G. Patterns of Transition from Plan to Market, World Bank Economic Review 10 (3), Pp.397-424, 1996.
- [30] DEGROOT, M. Optimal Statistical Decisions. Mellon University, John Wiley & Sons, INC Publication, 2004.
- [31] DESAI, P., IDSON, T. Work Without Wages: Russia's Nonpayment Crisis, Cambridge, mass, Mit Press,2000.
- [32] DESANTO, C., TOTORO, M. Introduction to Statistics, eighth edition,2008. Development, 2001. (<http://www.wdi.bus.umich.edu>).
- [33] DIETZENBACHER, E. On the Basis of Multiplier Estimates, Journal of Regional Science 35, pp 90–377, 1995.
- [34] DOMENICS, S. Statistics and econometrics, McGraw hill pub, 1982.
- [35] DOROODIAN, K. Does exchange rate volatility deter international trade in developing countries? Journal of Asian Economics, Elsevier Science, autumn 1999, vol. 10(3), Pp.465-474, 1999.
- [36] DUSEK, L. and KRESIMIR, Z. Czech Republic Year Book, Prague: CERGE-EI, 2005.
- [37] EBRD, Transition Report. London: European Bank for Reconstruction and Development, 1996.
- [38] EBRD, Transition Report. London: European Bank for Reconstruction and Development, 2000.
- [39] EBRD, Transition Report. London: European Bank for Reconstruction and Development, 2001. (<http://www.wdi.bus.umich.edu>).
- [40] EBRD: European Bank for Reconstruction and Development, Transition Report: Ten Years after Liberalisation., London, 1999. Employment Generating Industries,University of Wollongong, 2003.
- [41] FISCHER, S., SAHAY, R., VEGH, C. Papers and Proceedings of the Hundredth and Eighth Annual Meeting of the American Economic Association San

- Francisco. *The American Economic Review*, Vol. 86, No. 2, CA, January 5-7, 1996. May, 1996. pp. 229-233.
- [42] FLEK, V., MARKOVA, L. and PODPIERA, J, Sectoral Productivity and Real Exchange Rate Appreciation: Much do about nothing? CNB Working Paper Series 4, 2002.
- [43] FRANK, S. Changing Foreign Trade Patterns in Post-Reform Czech Industry (1989-1995): Empirical Evidence, *Europe-Asia Studies*, Vol. 49, No. 7. (Nov., 1997), pp. 1209-1235.
- [44] GILROY, C. Transforming Government Through Privatization, reason foundation report, 2006.
- [45] GOMULKA, S. Economic and Political Constraints during Transition, *Europe-Asia Studies*, Vol. 46, No. 1. (1994), pp. 89-106.
- [46] HAJEK, M., KLACEK, J. Present state and basic macroeconomic trends in the Czech Republic: Institute of Sociology, Prague. 1993.
- [47] HALPERN, L., WYPLOSZ, C. Equilibrium exchange rates in transition economies, *IMF Staff Papers* 44, Pp.430–461, 1997.
- [48] HAM, J., SVEJNAR, J., and TERRELL, K. Unemployment and the social safety net during transitions to market economy. Evidence from the Czech and Slovak republics, *America Economic Review*, December, pp, 117-142, 1998.
- [49] HANOSEK, J., KROCH, E. The Two Waves of Voucher Privatization in Czech Republic: A Model of Learning in Sequential Bidding. *Applied Economics*, Volume 30, January 1998, pp. 133 – 143.
- [50] HANOUSEK, J., KOCENDA, E., LIZAL, L. Tale of The Czech Transition: Understanding The Challenges Ahead. CERGE-EI, prague, 2004.
- [51] HANOUSEK, J., KOCENDA, E. Learning by Bidding: Evidence from a Large-Scale Natural Experiment. CERGE-EI Prague, March 2005. Working Paper Series 247, ISSN 1211-3298.
- [52] HAVRYLYSHYN, O. IVAILO I. and RON VAN R. Recovery and Growth in Transition Economies 1990-97: A Stylized Regression Analysis, *IMF Working Paper* WP/98/141, 1998
- [53] HRISTOVA, K. Czech Voucher Privatization: A Case of Decision Making Under Uncertainty. *Undergraduate Journal of Economics*, 2002. P. 1-6.
- [54] HRNEIR, M. External Flows of the Czech Republic: Past and Prospects. Prague: Institute of Sociology, 1993.

- [55] IMF: International Monetary Fund .
- [56] JENSEN, I. The Leontief Open Production Model or Input-Output
- [57] JILEK, J. The Evaluation of Official Statistical Data in the Czech Republic Since the 1989 Revaluation, University of Economics, Prague, April 1994.
- [58] JOHNSON, G. The Case for Flexible Exchange Rates, Federal Reserve Bank of St Louis Monthly Review, Vol. 51(6), Pp.12-24, 1969.
- [59] KATUSCAK, P. ZEMCIK, P. Czech Republic 2007: The Beginning of Fiscal Reform. Year Book, Prague, CERGE-EI, 2007.
- [60] KNELL, M. Structural Adjustments and Growth: Is Eastern Europe Catching Up? Economics of Transition - Structural Adjustments and Growth Perspectives in Eastern Europe, Cheltenham U.K.: Edward Elgar, 1-33, 1996.
- [61] KOCENDA, E. Exchange Rate in Transition, CERGE-EI, Charles University, 1998.
- [62] KOCH, B. Exchange Rates and Monetary Policy in Central Europe-a Survey of Some Issues, MOCT-MOST, 7(1), 1-48, 1997.
- [63] KORNAI, J. Anti-Depression Cure for Ailing Postcommunist Economies: Interview, Transition,4,1 February 1993, pp 1-3.
- [64] KORTBA, J. Czech Privatization: Players and Winners, CERGI-EI, April 1994, pp 3-18.
- [65] KOSOVA, R. Do Foreign Firms Crowd Out Domestic Firms? The Evidence from the Czech Republic, School of Business and Public Management, George Washington University, pp. 36-37, 2005.
- [66] KRUGMAN, P. and MAURICE, O. International Economics: Theory and Policy, 3. ed., New York: Harper Collins College Publisher. 1994.
- [67] LANDESMANN, A. Industrial Structural Change in Central and Eastern European Economies, Cambridge NY: Cambridge University Press, 76-124, 1995.
- [68] LASOVISKA, R. Investment behavior in Czech vocher privatization, CERGI-EI, august, pp. 1-9. 1993.
- [69] LIZAL, L., SVEJNAR, J. Investment, Credit Rationing and the soft Budget Constraint:Evidence from Czech Panel Data, Review Of Economics and Statistics, 2002.
- [70] NOVOTNY, V. et al. Makroekonomicka konjunkturni prognoza Ceske republiky. Praha, Ustav hospodarske politiky ER, 1993.
- [71] OECD: Organization for economic Co-operation and development.

- [72] PELKMANS, J. *European Integration: Methods and Economic Analysis*. Harlow: Longman, 1997.
- [73] PISTOR, K. *Corporate Governance Issues: A Preliminary Response*. Private Communication, 1999.
- [74] PODKAMINER, L. *External Deficits Lower Than Feared, Stability Again a Priority*, WIIW Research Report No. 243, Vienna.1998.
- [75] POSCHL, J. *Country report: WIIW Research Reports No.320, Special Issue on Economic Prospects for Central, East and Southeast Europe*, July 2005. press, 2005.
- [76] ROLAND, G. and THIERRY, V. *Transition and the Output Fall*, *Economics of Transition* 7 (1), Pp.1-28, 1999.
- [77] SABIRIANOVA, K., EARLE, J. *Worker Training in a Restructuring Economy: Evidence from the Russian Transition*, IZA Discussion Papers 361, Institute for the Study of Labor (IZA), 2001.
- [78] SACHS, J. *Economic Transition and the Exchange-rate Regime*, *American Economic Review Papers and Proceedings*, 86(May), p.147-152, 1996.
- [79] SANNA, F. *The Impact of Foreign Direct Investment on Home and Host Countries with Endogenous R&D*, *Review of International Economics*, Vol. 10, pp. 278-298, 2002.
- [80] SCHNEIDER, M. *Trade Effects of Economic Transition in Eastern Europe: Measuring Economic Benefits for Austria's Reigns by a Multiregional General Equilibrium Model*, Paper presented at the 38th Congress of the European Regional Science Association Vienna, Austria, August 28 - September 1, 1998.
- [81] SOJKA, M. *The Transformation of the Czech Economy - Present and Future Developments*, Institute of Economic Studies, Faculty of Social Sciences, Charles University, Prague, 1994.
- [82] STOCK, H. WATSON, W. *Introduction to Econometrics, Brief Edition*, the Addison Wesley Series in econometrics, 2008.
- [83] STUDENMUND, H. *Using Econometrics, a Practical Guide*, fifth Edition, the Addison Wesley Series in econometrics, 2006.
- [84] SUNJA, I. SNJANOVA, M. *The Macroeconomic Situation in the Czech republic*, The Czech Statistical Office, Prague, 1993.

- [85] SVEJNAR, J. Labor markets in the transitional Central and East European Economies, Handbook of labor economics, Volume 3B, Orley Ashhenfelter and David Card, eds,Amestrdam:North Holland, Chapter 42, 1999.
- [86] SVEJNAR, J. Transition Economies: Performance and Challenges. The Journal of Economic Perspectives, Vol. 16, No. 1, Winter, pp. 3-28, 2002.
- [87] TALIB, H. Introduction to Econometrics, University of Mousl, 1991.
- [88] THUIS, R. The Economics of Input-Output Analysis,cambridge university
- [89] Tirole, privatization in eastern Europe: incentives and the economics of transition,1991.
- [90] VALADKHANI, A.Using Input-Output Analysis to Identify Australia’s High
- [91] William Davidson Institute
- [92] WINIECKI, J. The Macroeconomics of Transition : Hardcover, 1993.
- [93] WOO, W., PARKE, S., SACHS, J. Economies in Transition: Comparing Asia and Eastern Europe. Massachusetts institute of technology, MIT press, 1997.
- [94] WOOLDRIDGE, J. Introductory Econometrics: A Modern Approach. 2nd Ed, Thomson, South- Western, 2003.
- [95] World Bank
- [96] ZINNES, C, EILAT ,Y, and SACHS J, The Gains from Privatization in Transition Economies:Is “Change of Ownership” Enough? Vol. 48, IMF, pp.146-170, 2001.

## **8 Appendix**

### **List of Appendix**

Appendix A - Table 1: Czech Cods of Exports and Imports by Commodity

Appendix B - Table 2: Czech Exports By commodity from 1999 to 2008/ Mill. CZK

Appendix C - Table 3: Czech Exports by Commodity Shears and it's Importance from  
1999 to 2008

Appendix D - Table 4: Czech Imports By commodity from 1999 to 2008/ Mill. CZK

Appendix E - Table 5: Czech Imports by Commodity Shears and it's Importance from  
1999 to 2008

Appendix F - Regression analysis of Exports and macroeconomic variables, using the  
real data in table 15

Appendix G - Regression analysis of Imports and macroeconomic variables, using the  
real data in table 15

## Appendix A

**Table 1: Czech Cods of Exports and Imports by Commodity**

01	Live animals
02	Meat and edible meat offal
03	Fish and crustaceans, molluscs and other aquatic invertebrates
04	Dairy produce; birds eggs; natural honey; edible products of animal or
05	Product of animal origin, not elsewhere specified or included
06	Live trees and other plants; bulbs, roots and the like; cut flowers an
07	Edible vegetables and certain roots and tubers
08	Edible fruit and nuts; peel of citrus fruits or melons
09	Coffee, tea, maté and spices
10	Cereals
11	Products of the milling industry; malt; starches; inulin; wheat gluten
12	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit
13	Lac; gums, resins and other vegetable saps and extracts
14	Vegetable plaiting materials; vegetable products not elsewhere specifi
15	Animal or vegetable fats and oils and their cleavage products; prepare
16	Preparations of meat, of fish or of crustaceans, molluscs or other aqu
17	Sugars and sugar confectionery
18	Cocoa and cocoa preparations
19	Preparations of cereals, flour, starch or milk; pastrycooks products
20	Preparations of vegetables, fruit, nuts or other parts of plants
21	Miscellaneous edible preparations
22	Beverages, spirits and vinegar
23	Residues and waste from the food industries; prepared animal fodder
24	Tobacco and manufactured tobacco substitutes
25	Salt; sulphur; earths and stone; plastering materials, lime and cement
26	Ores, slag and ash
27	Mineral fuels, mineral oils and products of their distillation; bitumi
28	Inorganic chemicals; organic or inorganic compounds of precious metals
29	Organic chemicals
30	Pharmaceutical products
31	Fertilisers
32	Tanning or dyeing extracts; tannins and their derivates; dyes, pigment
33	Essential oils and resinoids; perfumery, cosmetic or toilet preparatio
34	Soap,organic surface-active agents,washing preparations,lubricating pr
35	Albuminoidal substances; modified starches; glues; enzymes
36	Explosives; pyrotechnic products; matches; pyrophoric alloys; certain
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; saddlery and harness; travel goods, handbags and
43	Furskins and artificial fur; manufactures thereof
44	Wood and articles of wood; wood charcoal



45	Cork and articles of cork
46	Manufactures of straw, of esparto or of other plaiting materials; basket
47	Pulp of wood or of other fibrous cellulosic material; recovered (waste)
48	Paper and paperboard; articles of paper pulp, of paper or of paper board
49	Printed books, newspapers, pictures and other products of the printing
50	Silk
51	Wool, fine or coarse animal hair; horsehair yarn and woven fabric
52	Cotton
53	Other vegetable textile fibers; paper yarn and woven fabrics of paper
54	Man-made filaments
55	Man-made staple fibers
56	Wadding, felt and nonwovens; special yarns; twine, cordage, ropes and
57	Carpets and other textile floor coverings
58	Special woven fabrics; tufted textile fabrics; lace; tapestries; trim
59	Impregnated, coated, covered or laminated textile fabrics; textile art
60	Knitted or crocheted fabrics
61	Articles of apparel and clothing accessories, knitted or crocheted
62	Articles of apparel and clothing accessories, not knitted or crocheted
63	Other made-up textile articles; sets; worn clothing and worn textile a
64	Footwear, gaiters and the like; parts of such articles
65	Headgear and parts thereof
66	Umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding c
67	Prepared feathers and down and articles made of feathers or of down; a
68	Articles of stone, plaster, cement, asbestos, mica or similar material
69	Ceramic products
70	Glass and glassware
71	Natural or cultured pearls, precious or semi-precious stones, precious
72	Iron and steel
73	Articles of iron or steel
74	Copper and articles thereof.
75	Nickel and articles thereof
76	Aluminum 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, spoons and forks, of base metal; parts the
83	Miscellaneous articles of base metal
84	Nuclear reactors, boilers, machinery and mechanical appliances; parts
85	Electrical machinery and equipment and parts thereof; sound recorders
86	Railway or tramway locomotives, rolling-stock and parts thereof; railw
87	Vehicles other than railway or tramway rolling-stock and parts and acc
88	Aircraft, spacecraft, and parts thereof
89	Ships, boats and floating structures
90	Optical, photographic, cinematographic, measuring, checking, precision
91	Clocks and watches and parts thereof
92	Musical instruments; parts and accessories of such articles

<b>93</b>	Arms and ammunition; parts and accessories thereof
<b>94</b>	Furniture; bedding, mattresses, mattress supports, cushions and simila
<b>95</b>	Toys, games, and sports requisites; parts and accessories thereof
<b>96</b>	Miscellaneous manufactured articles
<b>97</b>	Works of art, collectors pieces and antiques

Source: CZSO External Database

## Appendix B

**Table 2: Czech Exports By commodity from 1999 to 2008/ Mill. CZK**

cods	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
01	75019	1176836	1515211	1545431	1455906	3268249	3833864	3889834	4227953	4917303
02	106788	1238764	2252145	2025344	1451453	2526449	2869582	2711971	3379136	4024449
03	143960	955565	1128174	1131243	1161411	1239951	1292148	1368855	1332315	1479960
04	430524	6773960	7794863	5534918	6254234	8238654	10470794	12476479	15519267	14623215
05	27337	261089	280745	484379	708359	617509	435700	531494	513816	533051
06	7067	148314	157587	205654	249615	269218	328551	328334	272070	292405
07	55209	551207	570434	444815	460671	788695	1349937	1950777	2064876	1992799
08	59931	1069853	752767	753561	756721	1753134	3265451	2100940	2363586	2344773
09	55102	578884	583028	498141	522162	494538	824203	1134716	1341922	1324117
10	460616	4310169	883010	804419	3398764	1670630	6801316	5657039	7331678	7559667
11	123112	2310536	1946892	1879770	2079500	2538512	1964792	2089009	2448737	3224618
12	760709	5315347	5068122	4262623	2643611	3619294	4582860	3361132	7210393	8386450
13	15034	309823	390892	501267	527971	736772	748499	585058	570438	763120
14	276	8728	3573	5100	5176	5249	4170	4868	2901	4711
15	123831	1580063	1709204	1176762	1072715	1226287	2065574	2611805	3347034	3925756
16	72919	902067	908119	565152	557588	991413	1682293	1769386	2283192	2712491
17	108936	2097538	3580745	3277500	3293513	7124748	8087675	6727278	5032496	5659660
18	117848	1622295	1894666	2088913	2672396	2722411	2716190	3255961	3627582	4050600
19	132524	1933323	2215190	2213950	2539118	2877462	3260322	3736623	4560371	5598830
20	70978	1299206	1390608	1258964	1447450	1719820	2020743	2196565	2562751	2240084
21	162569	3037117	3444528	4116145	5425303	5910750	6258919	6064357	7891702	8959135
22	465849	5244969	5659678	5809632	5570975	6517949	7317116	8311557	10296965	10198313
23	132612	1735559	2019321	1730520	1839126	2135445	2889744	3115141	3935370	4672387
24	235533	3267817	3261999	2859733	2710910	2532999	3449203	2562896	4763375	7056906
25	282705	4865261	4221699	3252974	3535073	4255294	3658963	3576939	3973491	3926180
26	8290	152586	195085	125574	164456	204166	168816	171181	217746	306909
27	2764064	34296300	38189526	35963963	39435563	49452352	56585960	60753327	66501642	83060293
28	656139	5685434	5577028	5271532	5586374	6339129	7637442	7686395	8080218	9581660
29	1641253	20679747	19754396	16311885	16302700	20733544	21802838	22180877	22561016	20155934
30	534311	6752038	8601567	7457295	8596599	11185794	13874847	17421195	20762535	21646757
31	122686	2255374	1913477	1404464	1850020	2013566	2158917	2354578	2836236	3801961
32	438766	6301384	5564582	5135700	5090211	6012076	6096356	6736195	7420428	6960101
33	167951	2802134	2838467	3296638	3363242	4081184	4353880	5551327	7469209	6956065
34	596407	7319167	8331199	10263391	9947767	10930774	12233023	13129658	14764062	14791698
35	50206	686146	819025	648872	701993	1015877	1193811	791497	884637	836312
36	83887	1015287	1101936	1098345	1198974	1485359	1781486	2207157	2441114	2660794
37	30056	402206	457213	394848	335120	636174	867575	913915	793707	673368
38	205458	3217200	4652221	3838867	4469809	5600475	7737260	8017618	7928985	8195447
39	2706429	39738285	42017018	39552428	46178207	62253327	68269857	75372087	83355682	83471907
40	2077082	25799157	28002748	33863729	34003177	43139600	44917098	50088299	59577005	53639053
41	136857	1833653	1931951	1619268	1392352	1232802	1146650	1477967	1743469	1851485
42	155679	2257736	2585497	2618096	2544673	3413370	2971131	3215845	4220027	4216275
43	39397	578501	627027	500681	398956	373289	303215	357191	302534	236862
44	1881158	25867018	25920836	23400982	26207895	30161929	30102241	33507194	37670723	33399537
45	1230	57107	16163	20476	27617	22305	21427	16591	15800	21853
46	2618	24001	23981	34968	33150	35891	36256	47496	21715	24632
47	449545	6659066	4909514	4461138	4418010	4898051	4940380	5243829	6217879	5636663

48	1250644	19914490	22310639	22457987	23940954	25944896	28098762	30914276	36544712	35245842
49	790151	10317669	12474397	13570443	17892434	18422701	17910876	19137540	21501690	22797782
50	743	2692	5331	4009	1906	4544	4281	2807	3399	4957
51	275111	4838119	5508221	5017974	5813344	6581085	6530282	7036034	6797607	5904012
52	493637	7226343	8052899	6985463	6567981	6734739	6302614	6125792	6682672	6079116
53	136721	1452460	1297567	1171796	1171270	1273110	1021038	847757	591880	380969
54	270526	5481908	5887978	4979923	4857067	6157227	6450568	6235288	6311221	5827962
55	344474	4784838	5137677	4214363	4571522	5086323	4867277	4595998	4733008	4075056
56	207759	3045223	3802785	3460510	3795469	4525511	5830223	6416391	7211828	7148342
57	82601	1340952	1480923	1316879	1425888	1709049	1907132	1827022	1781337	1827447
58	169493	2727699	3133617	3061778	2913512	2747687	2693223	2372747	1967390	1760521
59	267144	3957460	4074176	3690881	4202147	4212987	4466413	5201307	5648191	5554467
60	96473	1512692	1492935	1073614	1167823	1095386	1036248	1048755	1427629	1527418
61	501587	7212578	7000424	5767454	6127500	9079764	9489390	7326752	8451265	8138196
62	1119990	15346958	15281993	13141406	12052968	16440565	19837417	17629547	16627010	14824724
63	793333	9488685	10304587	9407827	9944230	10045382	9290071	9419751	9374046	8205564
64	470648	6577845	6562273	4492277	3802399	5097421	5981148	6528629	7831911	7081753
65	69343	996775	1076681	1077023	1125122	1185833	1200330	1248650	1300640	1160025
66	15739	257709	255288	187964	303358	245391	244572	312014	317838	378739
67	4942	63660	63830	61326	40007	59763	54051	58585	47658	58112
68	355886	7178755	7517991	7108403	7485463	8720402	8965120	10070603	11084942	10949586
69	914259	11676631	12242936	10859168	11232476	11506255	10484229	12214276	13729791	12736442
70	2224407	32962000	35923597	34897117	36996834	41460118	42162263	42580025	42367342	36890651
71	313943	4877736	5109622	4841531	5015088	4109547	2896868	3888474	3964369	5045292
72	2775858	38848737	42192811	39890554	46333157	70868173	72073301	80972371	93962060	99929142
73	4076705	62852258	68932158	61082775	67353350	87289560	96923588	106211801	122004251	124452812
74	207183	3714998	3577860	3030184	3437165	5565125	6718819	11996708	12836435	10264361
75	3706	133683	207160	147127	202388	258760	636220	1361904	905884	1006943
76	1060654	14844807	15156318	15330572	17592362	21418512	22039624	26385412	30151342	26692935
78	13365	266342	228021	163031	191284	282483	376441	579477	1137127	1154325
79	26099	544544	480144	431717	441701	630602	754676	1194389	2337864	1544488
80	1822	29656	53079	27868	44995	128663	121356	94714	162646	145438
81	97365	1737600	1643575	1478801	1820911	1731579	1460392	1500828	1302151	1653820
82	385952	5630310	7399433	6809382	7569353	8961370	8272296	8767763	10133260	11149278
83	667860	10646353	12620918	12811883	14532448	18155723	19863474	21086167	22404534	20665929
84	10238914	149664524	188871711	230084009	266838997	331433750	363985880	443433001	501650818	488484400
85	9898732	162515167	195246720	183094598	197111486	273713541	267642765	317182345	417041673	443413148
86	937772	10837353	11082194	9228340	11034588	12851448	11653968	15539706	19342864	18495624
87	13270012	175333393	203162346	199546292	210072041	258004747	307299162	368346510	415479424	390995355
88	351965	1759310	2651458	2833780	4542836	3254693	5915680	8168501	15024694	12120981
89	27386	374922	518369	374443	461906	688821	510162	810224	694148	840303
90	975999	14520086	17570539	17552102	21196111	29281804	30708777	36063411	35226735	35898381
91	38129	383006	281981	261927	235203	361410	277478	296981	335607	815833
92	146384	2360644	2287186	1935253	1784822	1615474	1481730	1363008	1235107	1055992
93	203884	2628239	2534947	2425313	2209221	2237856	2511063	2591392	3034085	2947482
94	2894504	40035015	45429051	45375838	45589178	52904703	57519800	57846222	62894526	60931604
95	356651	6658723	7696205	8070283	9218684	12295812	14520753	23388075	29713495	29546513
96	253833	4337888	4435127	4100981	3922659	4423916	4893662	5270817	5683472	5391109
97	13757	225687	227920	215986	159759	269487	321002	343787	171241	80256

Source: CZSO External Database

## Appendix C

**Table 3: Czech Exports by Commodity Shears and it's Importance from 1999 to 2008**

Cods	Exports	Shares	Cods	Exports	Shares	Cods	Exports	Shares
<b>84</b>	2974686004	18.8622	<b>88</b>	56623898	0.3590	<b>08</b>	15220717	0.0965
<b>87</b>	2541509282	16.1154	<b>32</b>	55755799	0.3535	<b>36</b>	15074339	0.0956
<b>85</b>	2466860175	15.6421	<b>64</b>	54426304	0.3451	<b>57</b>	14699230	0.0932
<b>73</b>	801179258	5.0802	<b>51</b>	54301789	0.3443	<b>81</b>	14427022	0.0915
<b>72</b>	587846164	3.7275	<b>38</b>	53863340	0.3415	<b>41</b>	14366454	0.0911
<b>39</b>	542915227	3.4426	<b>54</b>	52459668	0.3326	<b>16</b>	12444620	0.0789
<b>94</b>	471420441	2.9892	<b>21</b>	51270525	0.3251	<b>60</b>	11478973	0.0728
<b>27</b>	467002990	2.9612	<b>47</b>	47834075	0.3033	<b>03</b>	11233582	0.0712
<b>40</b>	375106948	2.3785	<b>56</b>	45444041	0.2882	<b>65</b>	10440422	0.0662
<b>70</b>	348464354	2.2096	<b>12</b>	45210541	0.2867	<b>07</b>	10229420	0.0649
<b>44</b>	268119513	1.7001	<b>17</b>	44990089	0.2853	<b>53</b>	9344568	0.0593
<b>48</b>	246623202	1.5638	<b>96</b>	42713464	0.2708	<b>79</b>	8386224	0.0532
<b>90</b>	238993945	1.5154	<b>55</b>	42410536	0.2689	<b>35</b>	7628376	0.0484
<b>76</b>	190672538	1.2090	<b>59</b>	41275173	0.2617	<b>09</b>	7356813	0.0466
<b>29</b>	182124190	1.1548	<b>33</b>	40880097	0.2592	<b>37</b>	5504182	0.0349
<b>49</b>	154815683	0.9817	<b>71</b>	40062470	0.2540	<b>89</b>	5300684	0.0336
<b>83</b>	153455289	0.9730	<b>10</b>	38877308	0.2465	<b>13</b>	5148874	0.0326
<b>62</b>	142302578	0.9023	<b>25</b>	35548579	0.2254	<b>75</b>	4863775	0.0308
<b>95</b>	141465194	0.8970	<b>24</b>	32701371	0.2074	<b>05</b>	4393479	0.0279
<b>86</b>	121003857	0.7673	<b>19</b>	29067713	0.1843	<b>78</b>	4391896	0.0278
<b>30</b>	116832938	0.7408	<b>42</b>	28198329	0.1788	<b>43</b>	3717653	0.0236
<b>69</b>	107596463	0.6823	<b>01</b>	25905606	0.1643	<b>91</b>	3287555	0.0208
<b>34</b>	102307146	0.6487	<b>18</b>	24768862	0.1571	<b>66</b>	2518612	0.0160
<b>04</b>	88116908	0.5587	<b>23</b>	24205225	0.1535	<b>06</b>	2258815	0.0143
<b>63</b>	86273476	0.5471	<b>58</b>	23547667	0.1493	<b>97</b>	2028882	0.0129
<b>68</b>	79437151	0.5037	<b>93</b>	23323482	0.1479	<b>26</b>	1714809	0.0109
<b>82</b>	75078397	0.4761	<b>02</b>	22586081	0.1432	<b>80</b>	810237	0.0051
<b>61</b>	69094910	0.4381	<b>31</b>	20711279	0.1313	<b>67</b>	511934	0.0032
<b>22</b>	65393003	0.4147	<b>11</b>	20605478	0.1307	<b>46</b>	284708	0.0018
<b>28</b>	62101351	0.3938	<b>15</b>	18839031	0.1195	<b>45</b>	220569	0.0014
<b>74</b>	61348838	0.3890	<b>20</b>	16207169	0.1028	<b>14</b>	44752	0.0003
<b>52</b>	61251256	0.3884	<b>92</b>	15265600	0.0968	<b>50</b>	34669	0.0002

Source: CZSO External Database

## Appendix D

**Table 4:Czech Imports By commodity from 1999 to 2008/ Mill. CZK**

code	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
01	45133	477055	357513	465662	453390	623871	1042657	994025	1007646	1490044
02	195270	2363166	2552128	2939593	3416199	7191956	10027359	10863579	12570211	13848047
03	129642	1458054	1764321	1553899	1457758	1489853	1838597	1957096	2113732	2317799
04	194848	2480095	2865063	3401507	3976941	5450898	7220951	8455760	10455049	10077898
05	80185	907208	991025	1033767	1293888	1024694	952842	1051994	1168799	1170895
06	129481	1771929	1924641	2112041	2357311	2673267	2614307	2583829	2974410	3118289
07	289524	4458364	4849316	5345768	5344735	6337052	6967662	8889588	9749966	8891261
08	841365	6950056	7532223	7959201	8168002	10698499	11740945	10781630	11375335	11675704
09	231685	2342446	1981835	1538432	1586927	1837606	2311143	2747977	3285927	3295295
10	152484	1521770	1511870	1232202	1197348	1307123	1169671	2361679	2677064	2440113
11	22409	351992	334947	414095	413862	552397	627821	671285	1118624	1112723
12	149114	1739299	2010449	1756884	1802254	2728572	2381002	2687929	2307501	2806045
13	25405	394535	334917	389059	455105	454549	511416	465926	668330	1030725
14	6144	109534	98220	79177	68996	48215	27709	28317	29808	32481
15	220094	2671255	3206392	3085941	3813299	4008439	3713024	4271117	3861715	5429382
16	180256	1659590	1730194	1672003	1764128	2216768	2666028	3149912	4155728	4246178
17	176237	2366327	2446802	2026335	1985812	3139532	3666752	3818417	5047409	3767974
18	245495	3216824	3659640	3618328	4040012	4849378	5007673	5660061	6196282	6095273
19	292466	3753691	4246758	4325873	4924626	6071575	6474465	6897464	7986554	8772189
20	318432	3273339	3326553	3534196	4012567	4453106	4793704	5379037	6554569	6545554
21	530239	7046947	7189553	6806210	7526302	7931567	8771186	8734416	10374334	10504920
22	360491	3462365	3881547	4074194	4715297	6523739	7093623	7929817	9314117	9734692
23	516596	6296139	7019661	7125176	6618110	7987557	7139590	7110454	7743083	8778412
24	378335	3939529	3412720	2550187	2866422	4221378	4762264	5245386	6596839	3406986
25	280971	4173386	4328342	4320734	4798549	5765462	5526139	6307072	6001853	6054085
26	539697	7262352	7464273	7589635	8530056	13882818	13580982	14602269	13254343	19486293
27	7959591	11996415 3	12584484 2	10030559 5	10787561 3	12223008 0	16763173 0	20089813 2	19135704 8	25000091 6
28	744467	9926309	11102461	9776883	10423822	12927276	14053339	14896471	15037893	16640649
29	886658	12310960	12553050	11256125	12112655	13969334	15734356	18070146	19867350	17615051
30	2702870	28268714	32969088	34105148	40105164	47296433	47862739	48833346	59455909	62602758
31	137808	2521030	3133697	2462266	2357052	3138202	3312514	3483857	4166940	7599235
32	905311	12160936	12546533	12220227	12900900	14348950	14157756	15406569	16979241	15689869
33	785749	8651000	8560974	9042456	9339082	10973343	10467738	11859086	13232004	12419248
34	528049	5564302	5961089	5836516	6535919	7916272	7892339	8831145	9651293	9880173
35	206955	2536647	2557398	2412615	2703017	3075650	3277215	3255929	3627455	3217725
36	77585	297428	247724	295697	456017	801157	599865	530309	618010	892169
37	182250	2194259	2211594	2262598	2288093	2462779	2264128	2078911	1608800	1391518
38	855902	12623993	13950661	13598640	14226235	16873632	16471407	17916809	20807523	21017951
39	4805123	68488222	74057324	74504804	83682836	10113639 5	10581586 0	11616997 0	12797784 2	11870049 7
40	1480407	21078852	23640133	23080248	25461563	32896385	33474356	36929671	42401601	41039983
41	358770	4595168	4974770	4656714	4094634	3884778	3678386	3701372	4160898	3875153
42	272082	3915128	4611796	4700994	4968464	6023556	5999868	6336432	7189481	7198544
43	19620	355155	349602	330818	316517	275935	287244	342040	353090	283991
44	837862	11091890	10940613	11111510	11878690	13745477	14152933	14642543	17330281	16661840

45	22340	225437	207415	207076	216219	180856	159093	172393	196818	177733
46	10930	134590	143896	155298	172292	188361	192738	219447	239016	234037
47	265663	3449098	2893656	2795834	2710255	2662339	2850490	2942624	3030102	2738119
48	2193513	27645236	29831251	29573958	31621445	35294340	35574350	36759867	41655770	41955598
49	876511	9843004	11487751	12420964	14590546	17678380	17230345	18637824	17609021	17628758
50	8894	96517	93909	61260	48913	48354	58327	56277	35574	49398
51	360497	6024173	6343366	6131481	5666947	6564178	5628698	5374832	5538254	5053265
52	718900	9192678	9758410	8406517	7761164	7624997	6694516	6641301	6884425	5373431
53	67027	774813	722998	663831	657321	778335	682087	510864	454559	326985
54	749306	10926418	10127863	8616593	8426727	9700069	9688725	9987773	9859381	8090897
55	510042	7084775	7154829	6271676	6281182	6833661	6596377	6682590	6734196	5519138
56	244301	3538858	4362294	4646353	5035570	5429552	5524427	6226034	7091130	6511195
57	203184	2420182	2789652	3021722	3216554	3575208	4226186	4059179	4212712	4154155
58	242588	2883230	2957862	2636319	2579967	2609449	2307658	2176069	2087182	2430380
59	394013	6149650	6788768	7723198	7899285	8592394	7965124	8296469	8207041	6817402
60	301132	3830725	3496933	2986262	2904846	2583621	2207198	2331786	2343157	1981514
61	480987	6400517	7119018	6878800	6885148	11603687	12511431	11372070	12619391	13681731
62	652933	8323173	9210592	9546681	9283565	15517354	18001309	16346258	17467649	18354908
63	226726	2701895	3328942	3799549	3792530	5230733	5140359	5346983	5698604	5477295
64	357214	6588614	7291019	7179644	6424074	7967670	9401892	10215051	11588186	12410410
65	33809	459391	522763	581516	585981	656782	749457	1009906	1047917	1039165
66	14217	246882	242046	258110	246456	230774	233826	249766	290616	357584
67	7766	131242	143645	174485	167452	157743	165190	168538	173551	190637
68	361273	5416511	5614402	5498052	5668871	6461468	6654362	7244434	8769799	8030593
69	470483	5999701	6416851	6366148	6519235	7411117	6902092	7084786	8974728	8129926
70	615629	8193166	11025979	12624814	13127320	15242264	14360497	15465275	16139019	14809520
71	256201	3233916	3184714	2845114	3206151	3465474	2960057	4487035	5162528	5947959
72	2806935	44362013	46215583	42224907	47083788	74301953	84624255	99790144	124061030	127065566
73	2489132	35533832	40207121	39859254	43744195	54477112	57603678	66836238	78977249	77630082
74	606124	10142718	10587484	9717958	10003946	14371286	16517017	28445851	31318402	24993506
75	49616	856773	1173204	1072666	1296176	1833269	2405319	3718930	4716583	2945875
76	1630734	21496899	23025164	22570614	24541146	29159758	29655231	38893633	45063388	40148094
78	93922	1085380	1268472	1112225	1084347	1891406	2161417	2766964	4312298	3202631
79	124318	1973492	1707480	1413903	1433926	1945997	2343356	4080935	5771877	3565267
80	12357	218803	212275	170155	206829	231479	219209	266677	408844	329582
81	178119	4203040	4369686	4438108	3601164	5068558	4638765	3536097	3915965	4303992
82	523931	6718787	7874233	7699990	8859213	11625125	11183746	10030791	11784312	13125836
83	745468	10761372	12277922	12325045	13233985	14478699	14581188	16387822	19355810	16921467
84	1555319 1	19854353 0	24127347 1	23206292 3	24749579 9	29341704 1	29295776 9	36034392 7	42369224 0	40305299 2
85	1651657 4	19765058 0	22421916 4	20475612 8	22756228 4	27870324 7	26587322 5	32051508 3	38361971 5	38576796 7
86	199987	3528895	3706639	2902677	4978822	6085811	5282122	6669921	7553043	6607136
87	7603382	92533356	11262475 4	11705128 6	12679474 7	15876626 5	15913223 0	18360877 5	21328091 0	20583309 8
88	96115	7374284	6301112	5612457	10957553	6744450	17408137	9010406	17536341	11579027
89	16406	179339	109929	128090	114874	109545	153476	203226	268904	395843
90	3144473	31845988	35007197	34842338	38025545	42288554	43312325	47727458	47914926	53767957
91	174075	1070917	999845	896232	869466	1097678	967338	1038384	1299897	1388891
92	69212	597104	590206	536459	487176	558064	528052	454309	547876	544545
93	35727	387489	375271	559797	1221943	1053112	1147489	694080	1479679	1568375
94	1530793	16812288	17632523	17426664	18974909	23441652	25428362	27537502	31156409	31939765

<b>95</b>	716845	6144609	6355283	7001957	8043595	10857578	12681507	18420597	19907204	18563957
<b>96</b>	260227	2901409	2894608	3038491	2819478	3321588	3599677	3743574	4122474	3824718
<b>97</b>	21653	95131	60380	1269437	2278046	874156	187621	1633839	102443	202474

Source: CZSO External Database



## Appendix E

**Table 5: Czech Imports by Commodity Shears and it's Importance from 1999 to 2008**

<b>Cods</b>	<b>Imports</b>	<b>Shares</b>	<b>Cods</b>	<b>Imports</b>	<b>Shares</b>	<b>Cods</b>	<b>Imports</b>	<b>Shares</b>
<b>84</b>	2708392883	16.968	<b>21</b>	75415674	0.472	<b>60</b>	24967174	0.156
<b>85</b>	2505183967	15.695	<b>52</b>	69056339	0.433	<b>79</b>	24360551	0.153
<b>27</b>	1394067700	8.734	<b>59</b>	68833344	0.431	<b>16</b>	23440785	0.147
<b>87</b>	1377228803	8.628	<b>34</b>	68597097	0.43	<b>58</b>	22910704	0.144
<b>39</b>	875338873	5.484	<b>23</b>	66334778	0.416	<b>6</b>	22259505	0.139
<b>72</b>	692536174	4.339	<b>2</b>	65967508	0.413	<b>9</b>	21159273	0.133
<b>73</b>	497357893	3.116	<b>69</b>	64275067	0.403	<b>12</b>	20369049	0.128
<b>30</b>	404202169	2.532	<b>7</b>	61123236	0.383	<b>75</b>	20068411	0.126
<b>90</b>	377876761	2.367	<b>68</b>	59719765	0.374	<b>78</b>	18979062	0.119
<b>48</b>	312105328	1.955	<b>55</b>	59668466	0.374	<b>37</b>	18944930	0.119
<b>40</b>	281483199	1.763	<b>22</b>	57089882	0.358	<b>3</b>	16080751	0.101
<b>76</b>	276184661	1.73	<b>4</b>	54579010	0.342	<b>10</b>	15571324	0.098
<b>94</b>	211880867	1.327	<b>19</b>	53745661	0.337	<b>91</b>	9802723	0.061
<b>74</b>	156704292	0.982	<b>51</b>	52685691	0.33	<b>5</b>	9675297	0.061
<b>38</b>	148342753	0.929	<b>42</b>	51216345	0.321	<b>93</b>	8522962	0.053
<b>49</b>	138003104	0.865	<b>56</b>	48609714	0.305	<b>1</b>	6956996	0.044
<b>29</b>	134375685	0.842	<b>25</b>	47556593	0.298	<b>97</b>	6725180	0.042
<b>83</b>	131068778	0.821	<b>86</b>	47515053	0.298	<b>65</b>	6686687	0.042
<b>32</b>	127316292	0.798	<b>18</b>	42588966	0.267	<b>53</b>	5638820	0.035
<b>62</b>	122704422	0.769	<b>20</b>	42191057	0.264	<b>11</b>	5620155	0.035
<b>44</b>	122393639	0.767	<b>63</b>	40743616	0.255	<b>92</b>	4913003	0.031
<b>70</b>	121603483	0.762	<b>81</b>	38253494	0.24	<b>36</b>	4815961	0.03
<b>28</b>	115529570	0.724	<b>41</b>	37980643	0.238	<b>13</b>	4729967	0.03
<b>95</b>	108693132	0.681	<b>24</b>	37380046	0.234	<b>43</b>	2914012	0.018
<b>26</b>	106192718	0.665	<b>71</b>	34749149	0.218	<b>66</b>	2370277	0.015
<b>33</b>	95330680	0.597	<b>15</b>	34280658	0.215	<b>80</b>	2276210	0.014
<b>88</b>	92619882	0.58	<b>31</b>	32312601	0.202	<b>45</b>	1765380	0.011
<b>61</b>	89552780	0.561	<b>57</b>	31878734	0.2	<b>46</b>	1690605	0.011
<b>82</b>	89425964	0.56	<b>96</b>	30526244	0.191	<b>89</b>	1679632	0.011
<b>8</b>	87722960	0.55	<b>17</b>	28441597	0.178	<b>67</b>	1480249	0.009
<b>54</b>	86173752	0.54	<b>35</b>	26870606	0.168	<b>50</b>	557423	0.003
<b>64</b>	79423774	0.498	<b>47</b>	26338180	0.165	<b>14</b>	528601	0.003

Source: CZSO External Database

## Appendix F

### Regression analysis of Exports and macroeconomic variables, using the real data in table 15:

18/10/2009 01:28:31

Welcome to Minitab, press F1 for help.

#### Regression Analysis: Ex versus GD; FD; LW; UR; ER; EC; LR; IR

The regression equation is

$$\text{Ex} = 93937 + 0.041 \text{ GD} + 0.034 \text{ FD} + 30.6 \text{ LW} - 2532 \text{ UR} - 0.037 \text{ ER} - 3001 \text{ EC} + 8011 \text{ LR} + 5562 \text{ IR}$$

Predictor	Coef	SE Coef	T	P
Constant	93937	3081657	0.03	0.977
GD	0.0405	0.3842	0.11	0.919
FD	0.0342	0.2632	0.13	0.900
LW	30.58	57.80	0.53	0.613
UR	-2532	41858	-0.06	0.953
ER	-0.0371	0.5843	-0.06	0.951
EC	-3001	5578	-0.54	0.607
LR	8011	11254	0.71	0.500
IR	5562	7051	0.79	0.456

S = 54019                      R-Sq = 96.3%                      R-Sq(adj) = 92.1%  
PRESS = 148574239459      R-Sq(pred) = 73.10%

#### Analysis of Variance

Source	DF	SS	MS	F	P
Regression	8	5.31873E+11	66484089451	22.78	0.000
Residual Error	7	20426056625	2918008089		
Total	15	5.52299E+11			

Durbin-Watson statistic = 1.97

#### Regression Analysis: Ex versus GD

The regression equation is

$$\text{Ex} = -136573 + 0.231 \text{ GD}$$

Predictor	Coef	SE Coef	T	P
Constant	-136573	35313	-3.87	0.002
GD	0.23093	0.01448	15.95	0.000

S = 45374                      R-Sq = 94.8%                      R-Sq(adj) = 94.4%  
PRESS = 41248599870      R-Sq(pred) = 92.53%

#### Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	5.23475E+11	5.23475E+11	254.26	0.000
Residual Error	14	28823423274	2058815948		
Total	15	5.52299E+11			

Durbin-Watson statistic = 1.14

#### Regression Analysis: Ex versus FD

The regression equation is

$$\text{Ex} = 228626 + 1.23 \text{ FD}$$

Predictor	Coef	SE Coef	T	P
Constant	228626	77280	2.96	0.010
FD	1.2299	0.4796	2.56	0.022

S = 163837                      R-Sq = 32.0%                      R-Sq(adj) = 27.1%  
PRESS = 471595325069      R-Sq(pred) = 14.61%

#### Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	1.76502E+11	1.76502E+11	6.58	0.022
Residual Error	14	3.75797E+11	26842611149		
Total	15	5.52299E+11			

Durbin-Watson statistic = 0.62

### Regression Analysis: Ex versus LW

The regression equation is

$$Ex = -118341 + 36.0 LW$$

Predictor	Coef	SE Coef	T	P
Constant	-118341	34960	-3.39	0.004
LW	35.969	2.304	15.61	0.000

S = 46292                      R-Sq = 94.6%                      R-Sq(adj) = 94.2%  
PRESS = 41154261370        R-Sq(pred) = 92.55%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	5.22297E+11	5.22297E+11	243.73	0.000
Residual Error	14	30001507239	2142964803		
Total	15	5.52299E+11			

Durbin-Watson statistic = 1.04

### Regression Analysis: Ex versus UR

The regression equation is

$$Ex = 122222 + 42862 UR$$

Predictor	Coef	SE Coef	T	P
Constant	122222	177273	0.69	0.502
UR	42862	26752	1.60	0.131

S = 182585                      R-Sq = 15.5%                      R-Sq(adj) = 9.5%  
PRESS = 583043684748        R-Sq(pred) = 0.00%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	85576998713	85576998713	2.57	0.131
Residual Error	14	4.66722E+11	33337269537		
Total	15	5.52299E+11			

Durbin-Watson statistic = 0.17

### Regression Analysis: Ex versus ER

The regression equation is

$$Ex = 100837 + 0.058 ER$$

Predictor	Coef	SE Coef	T	P
Constant	100837	2269530	0.04	0.965
ER	0.0584	0.4477	0.13	0.898

S = 198500                      R-Sq = 0.1%                      R-Sq(adj) = 0.0%  
PRESS = 735305185933        R-Sq(pred) = 0.00%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	669803289	669803289	0.02	0.898
Residual Error	14	5.51629E+11	39402069210		
Total	15	5.52299E+11			

Durbin-Watson statistic = 0.09

### Regression Analysis: Ex versus EC

The regression equation is

$$Ex = 942627 - 19002 EC$$

Predictor	Coef	SE Coef	T	P
Constant	942627	215394	4.38	0.001
EC	-19002	7360	-2.58	0.022

S = 163483                      R-Sq = 32.3%                      R-Sq(adj) = 27.4%  
PRESS = 497018146173        R-Sq(pred) = 10.01%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	1.78124E+11	1.78124E+11	6.66	0.022
Residual Error	14	3.74175E+11	26726780968		
Total	15	5.52299E+11			

Durbin-Watson statistic = 0.24

**Regression Analysis: Ex versus LR**

The regression equation is

Ex = 288630 + 36937 LR

Predictor	Coef	SE Coef	T	P
Constant	288630	75586	3.82	0.002
LR	36937	20798	1.78	0.097

S = 179434                      R-Sq = 18.4%                      R-Sq(adj) = 12.6%  
PRESS = 552241226186        R-Sq(pred) = 0.01%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	1.01547E+11	1.01547E+11	3.15	0.097
Residual Error	14	4.50752E+11	32196558891		
Total	15	5.52299E+11			

Durbin-Watson statistic = 0.37

**Regression Analysis: Ex versus IR**

The regression equation is

Ex = 540757 - 23816 IR

Predictor	Coef	SE Coef	T	P
Constant	540757	59429	9.10	0.000
IR	-23816	7556	-3.15	0.007

S = 151903                      R-Sq = 41.5%                      R-Sq(adj) = 37.3%  
PRESS = 440543471399        R-Sq(pred) = 20.23%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	2.29254E+11	2.29254E+11	9.94	0.007
Residual Error	14	3.23045E+11	23074619093		
Total	15	5.52299E+11			

Durbin-Watson statistic = 0.48

**Regression Analysis: Ex versus IM**

The regression equation is

Ex = - 47663 + 1.09 IM

Predictor	Coef	SE Coef	T	P
Constant	-47663	9756	-4.89	0.000
IM	1.08896	0.02207	49.35	0.000

S = 15017                      R-Sq = 99.4%                      R-Sq(adj) = 99.4%  
PRESS = 4333415756        R-Sq(pred) = 99.22%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	5.49142E+11	5.49142E+11	2435.04	0.000
Residual Error	14	3157235183	225516799		
Total	15	5.52299E+11			

Durbin-Watson statistic = 0.66

### Regression Analysis: Ex versus GD; FD; LW

The regression equation is

$$\text{Ex} = -131754 + 0.130 \text{ GD} - 0.137 \text{ FD} + 17.3 \text{ LW}$$

Predictor	Coef	SE Coef	T	P
Constant	-131754	38257	-3.44	0.005
GD	0.1300	0.1591	0.82	0.430
FD	-0.1374	0.1786	-0.77	0.457
LW	17.26	25.10	0.69	0.505

S = 47276                      R-Sq = 95.1%                      R-Sq(adj) = 93.9%  
PRESS = 58380965977              R-Sq(pred) = 89.43%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	3	5.25479E+11	1.75160E+11	78.37	0.000
Residual Error	12	26819857360	2234988113		
Total	15	5.52299E+11			

Durbin-Watson statistic = 1.18

### Regression Analysis: Ex versus IM; GD

The regression equation is

$$\text{Ex} = -29083 + 1.27 \text{ IM} - 0.0401 \text{ GD}$$

Predictor	Coef	SE Coef	T	P
Constant	-29083	14478	-2.01	0.066
IM	1.2701	0.1110	11.44	0.000
GD	-0.04006	0.02412	-1.66	0.121

S = 14154                      R-Sq = 99.5%                      R-Sq(adj) = 99.5%  
PRESS = 4155773065              R-Sq(pred) = 99.25%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	2	5.49694E+11	2.74847E+11	1371.95	0.000
Residual Error	13	2604335955	200333535		
Total	15	5.52299E+11			

Durbin-Watson statistic = 0.81

18/10/2009 02:48:12

## Appendix G

### Regression analysis of Imports and macroeconomic variables, using the real data in table 15:

18/10/2009 03:22:38

Welcome to Minitab, press F1 for help.

#### Regression Analysis: IM versus Ex; GD; FD; LW; UR; ER; EC; LR; IR

The regression equation is

$$\text{IM} = 583768 + 0.748 \text{ Ex} + 0.0698 \text{ GD} - 0.0526 \text{ FD} - 2.73 \text{ LW} - 7609 \text{ UR} - 0.114 \text{ ER} + 1709 \text{ EC} - 254 \text{ LR} - 1360 \text{ IR}$$

Predictor	Coef	SE Coef	T	P
Constant	583768	374035	1.56	0.170
Ex	0.74830	0.04587	16.31	0.000
GD	0.06982	0.04666	1.50	0.185
FD	-0.05257	0.03198	-1.64	0.151
LW	-2.727	7.154	-0.38	0.716
UR	-7609	5081	-1.50	0.185
ER	-0.11424	0.07093	-1.61	0.158
EC	1708.8	690.8	2.47	0.048
LR	-254	1414	-0.18	0.864
IR	-1360.3	893.0	-1.52	0.178

S = 6556                      R-Sq = 99.9%                      R-Sq(adj) = 99.9%  
PRESS = 1692143343              R-Sq(pred) = 99.63%

#### Analysis of Variance

Source	DF	SS	MS	F	P
Regression	9	4.62824E+11	51424845823	1196.43	0.000
Residual Error	6	257890915	42981819		
Total	15	4.63082E+11			

Durbin-Watson statistic = 2.68

#### Regression Analysis: IM versus GD; FD; LW; UR; ER; EC; LR; IR

The regression equation is

$$\text{IM} = 654037 + 0.100 \text{ GD} - 0.027 \text{ FD} + 20.2 \text{ LW} - 9503 \text{ UR} - 0.142 \text{ ER} - 537 \text{ EC} + 5741 \text{ LR} + 2802 \text{ IR}$$

Predictor	Coef	SE Coef	T	P
Constant	654037	2331840	0.28	0.787
GD	0.1001	0.2907	0.34	0.741
FD	-0.0270	0.1991	-0.14	0.896
LW	20.16	43.74	0.46	0.659
UR	-9503	31673	-0.30	0.773
ER	-0.1420	0.4421	-0.32	0.757
EC	-537	4221	-0.13	0.902
LR	5741	8516	0.67	0.522
IR	2802	5335	0.53	0.616

S = 40875                      R-Sq = 97.5%                      R-Sq(adj) = 94.6%  
PRESS = 82800965543              R-Sq(pred) = 82.12%

#### Analysis of Variance

Source	DF	SS	MS	F	P
Regression	8	4.51386E+11	56423270844	33.77	0.000
Residual Error	7	11695336565	1670762366		
Total	15	4.63082E+11			

Durbin-Watson statistic = 1.97

### Regression Analysis: IM versus Ex

The regression equation is  
 $IM = 45851 + 0.913 \text{ Ex}$

Predictor	Coef	SE Coef	T	P
Constant	45851	8105	5.66	0.000
Ex	0.91305	0.01850	49.35	0.000

S = 13751                      R-Sq = 99.4%                      R-Sq(adj) = 99.4%  
PRESS = 3605740524              R-Sq(pred) = 99.22%

#### Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	4.60434E+11	4.60434E+11	2435.08	0.000
Residual Error	14	2647176113	189084008		
Total	15	4.63082E+11			

Durbin-Watson statistic = 0.65

### Regression Analysis: IM versus GD

The regression equation is  
 $IM = -84628 + 0.213 \text{ GD}$

Predictor	Coef	SE Coef	T	P
Constant	-84628	26517	-3.19	0.007
GD	0.21336	0.01088	19.62	0.000

S = 34071                      R-Sq = 96.5%                      R-Sq(adj) = 96.2%  
PRESS = 22906393553              R-Sq(pred) = 95.05%

#### Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	4.46829E+11	4.46829E+11	384.91	0.000
Residual Error	14	16252133684	1160866692		
Total	15	4.63082E+11			

Durbin-Watson statistic = 1.38

### Regression Analysis: IM versus FD

The regression equation is  
 $IM = 248162 + 1.17 \text{ FD}$

Predictor	Coef	SE Coef	T	P
Constant	248162	69430	3.57	0.003
FD	1.1701	0.4309	2.72	0.017

S = 147195                      R-Sq = 34.5%                      R-Sq(adj) = 29.8%  
PRESS = 381525774277              R-Sq(pred) = 17.61%

#### Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	1.59752E+11	1.59752E+11	7.37	0.017
Residual Error	14	3.03330E+11	21666399591		
Total	15	4.63082E+11			

Durbin-Watson statistic = 0.70

### Regression Analysis: IM versus LW

The regression equation is  
 $IM = -68951 + 33.3 \text{ LW}$

Predictor	Coef	SE Coef	T	P
Constant	-68951	24775	-2.78	0.015
LW	33.313	1.633	20.40	0.000

S = 32806                      R-Sq = 96.7%                      R-Sq(adj) = 96.5%  
PRESS = 20320538569              R-Sq(pred) = 95.61%

#### Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	4.48014E+11	4.48014E+11	416.28	0.000
Residual Error	14	15067118796	1076222771		
Total	15	4.63082E+11			

Durbin-Watson statistic = 1.35

#### Regression Analysis: IM versus UR

The regression equation is

$$IM = 128904 + 43593 UR$$

Predictor	Coef	SE Coef	T	P
Constant	128904	158809	0.81	0.431
UR	43593	23965	1.82	0.090

S = 163567                      R-Sq = 19.1%                      R-Sq(adj) = 13.3%  
PRESS = 468486071016      R-Sq(pred) = 0.00%

#### Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	88521228319	88521228319	3.31	0.090
Residual Error	14	3.74560E+11	26754305357		
Total	15	4.63082E+11			

Durbin-Watson statistic = 0.17

#### Regression Analysis: IM versus ER

The regression equation is

$$IM = 438257 - 0.006 ER$$

Predictor	Coef	SE Coef	T	P
Constant	438257	2079399	0.21	0.836
ER	-0.0060	0.4102	-0.01	0.989

S = 181870                      R-Sq = 0.0%                      R-Sq(adj) = 0.0%  
PRESS = 617766971031      R-Sq(pred) = 0.00%

#### Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	6991653	6991653	0.00	0.989
Residual Error	14	4.63075E+11	33076750833		
Total	15	4.63082E+11			

Durbin-Watson statistic = 0.08

#### Regression Analysis: IM versus EC

The regression equation is

$$IM = 872553 - 16167 EC$$

Predictor	Coef	SE Coef	T	P
Constant	872553	203543	4.29	0.001
EC	-16167	6956	-2.32	0.036

S = 154488                      R-Sq = 27.8%                      R-Sq(adj) = 22.7%  
PRESS = 441190332304      R-Sq(pred) = 4.73%

#### Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	1.28948E+11	1.28948E+11	5.40	0.036
Residual Error	14	3.34134E+11	23866692909		
Total	15	4.63082E+11			

Durbin-Watson statistic = 0.20



### Regression Analysis: IM versus LR

The regression equation is  
IM = 302573 + 36054 LR

Predictor	Coef	SE Coef	T	P
Constant	302573	68141	4.44	0.001
LR	36054	18750	1.92	0.075

S = 161760                      R-Sq = 20.9%                      R-Sq(adj) = 15.2%  
PRESS = 450313776472      R-Sq(pred) = 2.76%

#### Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	96753260817	96753260817	3.70	0.075
Residual Error	14	3.66328E+11	26166303036		
Total	15	4.63082E+11			

Durbin-Watson statistic = 0.40

### Regression Analysis: IM versus IR

The regression equation is  
IM = 548157 - 23161 IR

Predictor	Coef	SE Coef	T	P
Constant	548157	51888	10.56	0.000
IR	-23161	6597	-3.51	0.003

S = 132629                      R-Sq = 46.8%                      R-Sq(adj) = 43.0%  
PRESS = 338179576502      R-Sq(pred) = 26.97%

#### Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	2.16816E+11	2.16816E+11	12.33	0.003
Residual Error	14	2.46265E+11	17590385338		
Total	15	4.63082E+11			

Durbin-Watson statistic = 0.54

### Regression Analysis: IM versus GD; FD; EC; LR

The regression equation is  
IM = - 34622 + 0.204 GD - 0.030 FD - 1402 EC + 5684 LR

Predictor	Coef	SE Coef	T	P
Constant	-34622	95790	-0.36	0.725
GD	0.20374	0.02217	9.19	0.000
FD	-0.0302	0.1693	-0.18	0.862
EC	-1402	2425	-0.58	0.575
LR	5684	4786	1.19	0.260

S = 35780                      R-Sq = 97.0%                      R-Sq(adj) = 95.9%  
PRESS = 29544972358      R-Sq(pred) = 93.62%

#### Analysis of Variance

Source	DF	SS	MS	F	P
Regression	4	4.48999E+11	1.12250E+11	87.68	0.000
Residual Error	11	14082191948	1280199268		
Total	15	4.63082E+11			

Durbin-Watson statistic = 1.68

### Regression Analysis: IM versus GD; FD; EC

The regression equation is  
IM = - 52227 + 0.211 GD - 0.013 FD - 879 EC

Predictor	Coef	SE Coef	T	P
Constant	-52227	96240	-0.54	0.597
GD	0.21102	0.02167	9.74	0.000

FD	-0.0128	0.1715	-0.07	0.942
EC	-879	2425	-0.36	0.723

S = 36386                      R-Sq = 96.6%                      R-Sq(adj) = 95.7%  
PRESS = 27799862972        R-Sq(pred) = 94.00%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	3	4.47194E+11	1.49065E+11	112.59	0.000
Residual Error	12	15887714193	1323976183		
Total	15	4.63082E+11			

Durbin-Watson statistic = 1.45

**Regression Analysis: IM versus EC; IR**

The regression equation is  
IM = 975076 - 15053 EC - 22240 IR

Predictor	Coef	SE Coef	T	P
Constant	975076	136201	7.16	0.000
EC	-15053	4592	-3.28	0.006
IR	-22240	5073	-4.38	0.001

S = 101841                      R-Sq = 70.9%                      R-Sq(adj) = 66.4%  
PRESS = 232226795323        R-Sq(pred) = 49.85%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	2	3.28252E+11	1.64126E+11	15.82	0.000
Residual Error	13	1.34830E+11	10371509255		
Total	15	4.63082E+11			

Durbin-Watson statistic = 1.13

**Regression Analysis: IM versus GD; LW; LR; IR**

The regression equation is  
IM = - 147889 + 0.034 GD + 29.9 LW + 7346 LR + 4547 IR

Predictor	Coef	SE Coef	T	P
Constant	-147889	61422	-2.41	0.035
GD	0.0341	0.1312	0.26	0.800
LW	29.91	21.58	1.39	0.193
LR	7346	5874	1.25	0.237
IR	4547	3585	1.27	0.231

S = 33493                      R-Sq = 97.3%                      R-Sq(adj) = 96.4%  
PRESS = 26772357253        R-Sq(pred) = 94.22%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	4	4.50742E+11	1.12686E+11	100.45	0.000
Residual Error	11	12339373906	1121761264		
Total	15	4.63082E+11			

Durbin-Watson statistic = 2.02

**Regression Analysis: IM versus Ex; GD; LW; LR; IR**

The regression equation is  
IM = 31909 + 0.716 Ex + 0.0063 GD + 5.66 LW + 958 LR - 1024 IR

Predictor	Coef	SE Coef	T	P
Constant	31909	20169	1.58	0.145
Ex	0.71578	0.05395	13.27	0.000
GD	0.00630	0.03197	0.20	0.848
LW	5.659	5.556	1.02	0.332
LR	958	1508	0.64	0.539
IR	-1023.7	967.8	-1.06	0.315

S = 8145                      R-Sq = 99.9%                      R-Sq(adj) = 99.8%  
PRESS = 1405977011        R-Sq(pred) = 99.70%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	5	4.62418E+11	92483624815	1394.13	0.000
Residual Error	10	663379242	66337924		
Total	15	4.63082E+11			

Durbin-Watson statistic = 2.15

---

**18/10/2009 03:57:59**

---