ESTIMATING EXCHANGE RATE PASS-THROUGH IN THE REPUBLIC OF MOLDOVA

by

Natalia Bodrug

A thesis submitted in partial fulfillment of
the requirements for the degree of

MA in Economic Analysis

Kyiv School of Economics

2011

Thesis Supervisor: _____Professor Olesia Verchenko

Approved by _____
Head of the KSE Defense Committee, Professor Wolfram Schrettl

_____

_____

_____

Date _____

Kyiv School of Economics

Abstract

ESTIMATING EXCHANGE RATE PASS-THROUGH IN THE REPUBLIC OF MOLDOVA

by Natalia Bodrug

Thesis Supervisor: Professor Olesia Verchenko

This thesis investigates the exchange rate pass-through mechanism in the Republic of Moldova and compares it to that observed in other groups of countries (mainly focusing on developing countries). The main goal of this investigation is to evaluate the extent and the speed of the pass-through effect, which implication is important for designing macroeconomic policy by the National Bank of the Republic of Moldova. For these purposes VAR methodology with post-estimation techniques such as Impulse-Response Functions, Variance Decompositon, as well as Granger causality procedure are incorporated. The obtained results reveal weak exchange rate channel of monetary transmission mechanism. Moreover, the exchange rate pass-through is higher for goods, mostly incorporated in export and import operations. There is also observed bi-lateral causal relationship: especially, high reverse causation is typical for foodstuff products and goods of first priority.

To Andrei Bodrug, my dear brother, lifelong assistant and adviser

TABLE OF CONTENTS

Chapter 1. INTRODUCTION 1

Chapter 2. LITERATURE REVIEW 6

Chapter 3. THEORETICAL BACKGROUND AND METHODOLOGY 13

3.1. EMPIRICAL METHODOLOGY 18

Chapter 4. DATA DISCRIPTION 21

Chapter 5. EMPIRICAL ANALYSIS 26

Chapter 6. CONCLUSION 38

WORKS CITED 40

APPENDIX A 44

APPENDIX B 50

APPENDIX C 54

APPENDIX D 58

LIST OF FIGURES

Number *Page*

Figure 1: Graphical representation of Dornbusch (1976) Model…… 16

Figure 2: Impulse-response of consumer prices to a 1 unit in Exchange Rate Growth…… 31

Figure 3: Impulse-response of PPI to a 1 Unit in Exchange Rate Growth…… 32

Figure 4: Accumulated impulse responses of consumer prices to a 1 Unit of exchange rate growth……. 33

Figure 5: Accumulated impulse responses of PPI to a 1 Unit of exchange rate growth……... 34

Figure 6: Variance Decomposition for consumer prices……. 35

Figure 7: Variance Decomposition for PPI…… 35

LIST OF TABLES

Number	*Page*
Table 1: Exchange rate pass-through into price indices from Impulse-Response function……..	32
Table 2: The results from Granger Causality Wald Test……...	36
Table A1: Descriptive Statistics of Total CPI and its disaggregated indices..	45
Table A2: Descriptive Statistics of Total PPI and its disaggregated indices...	47
Table A3 Descriptive Statistics of explanatory variables……..	49
Table B1: Augmented Dickey-Fuller Test results for CPI……	50
Table B2: Augmented Dickey-Fuller Test results for PPI……	52
Table B3: Augmented Dickey-Fuller Test results for explanatory variables..	53
Table C1: Cointegration results for CPI by category……	54
Table C2: Cointegration results for PPI by category……	56
Table D1: VAR estimations for CPI by category……	58
Table D2: VAR estimations for PPI by category……	67

ACKNOWLEDGMENTS

The author is grateful to the professor Olesia Verchenko for her supervision, guidance and relevant instructions. Also, I would like to express my gratitude to professors Iikka Korhonen and Aaron Mehrotra for their useful advice in the field of Monetary Economics.

I am thankful to Professor Tom Coupe for his valuable comments and suggestions, Professor Alexander Shepotylo for his help with software commands.

I also owe my deepest gratitude to research workshop professors Hanna Vakhitova, Denys Nizalov, Olena Nizalova, Elena Besedina for their relevant remarks and assistance.

GLOSSARY

Exchange rate pass-through. The process of how home prices change in response to volatilities of exchange rates.

Chapter 1

INTRODUCTION

The level of inflation is one of the main macroeconomic indicators of a country's 'economic health'. In the context of the protracted economic decline and in view of the ambition of the Moldavian government to converge the national economy towards the European Union economic standards, the understanding of causes of inflation, as one of the main condition required by the Maastricht criteria, is essential for running good macroeconomic policy, promoting economic growth and maintaining economic stability.

According to the Law on the National Bank of Moldova (July, 1995), the primary objective of monetary policy was to achieve and maintain the stability of the national currency, which was attained by monetary aggregates targeting. Since 2006, the amendment to this law states that the primary objective was modified 'to achieving and maintaining price stability'. In connection with monetary goals changes, in 2009, the National Bank of Moldova (NBM) passed from monetary targeting to inflation rate targeting. The later monetary policy has become quite 'popular' among most industrialized countries and has started to be adopted by many developing countries during the last two decades. So, the question arises: 'Which monetary methods or techniques are more useful to achieve low level of inflation?'

Among the channels of transmission mechanism, the exchange rate channel is known to be one of the influenced in regulating inflation level. The notion of "pass-through effect" in broader sense can be defined as the percentage change in domestic prices resulting from a one percent change in the exchange rate (Menon, 1995; McCarthy, 2000; Goldber and Knetter, 1997).

The problem of examining the exchange rate pass-through (henceforth ERPT) attracts particular attention due to several reasons. Firstly, the volatility of exchange rates has increased dramatically in recent years. Since the Breton Woods system of fixed exchange rate collapsed in the early 1970s and most countries allowed exchange rates to be changed daily, the volatility of exchange rates has become one of the main problems for monetary policy regulations. Secondly, intense globalization process, trade integration and, therefore, trade flows and foreign direct investments led to close interaction between countries, cross-country capital flows, which exacerbate exchange rate volatility. If there is a relationship between prices and exchange rates, is it reasonable to expect higher price volatility due to higher volatility of exchange rates and how then should monetary authority react in this situation?

The other reason that intensifies studying this problem in the Republic of Moldova is high amount of foreign capital inflows coming into the country from abroad. Most part of the capital is represented by the remittances, received by domestic households. The rest comes in through investments, financial support or credits from intergovernmental organizations, such as International monetary Fund (IMF), World Bank, European Bank for Reconstruction and Development or other government and non-government structures. These abundant foreign cash flows lead to macroeconomic disbalances through high amount of financial operations on currency conversions, higher market liquidity, etc.

So, the main goal of this research work is to estimate the exchange rate pass-through on domestic prices by category of good produced and consumed in the republic of Moldova, i.e. short-run and long-run relationship between the exchange rate, the price level and controlling for such variables as money supply, world oil prices, Output Gap, etc. Most of the studies concentrate on estimating ERPT for aggregated indices, making the assumption of the pass-through effect

equalization for all groups of goods consumed or produced. In the majority of cases this is done due to estimations' simplification or due to lack of data. However this approach is heavily criticized. This problem was particularly addressed in Parsley (1995), who gives several contra-arguments against aggregated data usage. First of all, aggregated basket can change in composition during the studied period. The second argument is that some sectors of the economy are more sensitive to inflation or to exchange rate shocks, which leads to errors in estimation and conclusions of ERPT effect. It is erroneous to provide general implications, without taking into account different economic sectors' peculiarities.

Thus, the data will include Nominal Effective Exchange Rate, taken from the IMF Financial Statistics, the data on consumer price indices (CPI), producer price indices (PPI), which are taken from the National Bureau of Statistics of the Republic of Moldova. All data are disaggregated, i.e. CPI are divided by groups of goods and services and PPI data are divided by market, economic activities.

The theoretical background of this research is based on purchasing power parity theory and Dornbusch's (1976) monetary model for a small open economy with floating exchange rate and perfect capital mobility.

From the technical point of view, a VAR model, followed by Granger causality test, cumulative impulse responses of domestic inflation to exchange rate shock, as well as variance decomposition techniques will be used.

Although there is plenty of literature available, which studies this topic for group of countries and for individual countries as well, for the republic of Moldova there is only one study, done by Korhonen et al. (2005) for the period between 1999 and 2004, estimating only ERPT for aggregated CPI index.

The exchange rate pass-through effect is known to be most evident in countries with large amount of export-import operations (McCarthy, 2000) and with high openness of the economy. Moldova represents the country where export accounts for less than 45 percent of import.[1] In addition, Frankel, Parsley and Wei (2005) and Dobrynska (2005) mentioned that the more developed country is, the smaller effect of exchange rates on prices is observed. Some investigations also demonstrate that the exchange rate pass-through would be higher for countries with less credible monetary policy (Devereux and Lane, 2001, Bacchetta and van Wincoop, 2001, Taylor, 2000). So, the magnitude of the ERPT in Moldova is suspected to be higher and the speed is faster than in countries with lower inflation rates (most of which are industrial) (for example Choudri and Hakura, 2001; Ross, 1998; Doyle et al., 2001).

This work will be valuable for monetary policy authority, for National Bureau for price regulations, as well as for business companies which are engaged in export/import operations and even for foreign trade-partners, and investors. For the monetary authorities, it is crucial to know the exact amount of ERPT for correctly predicting the dynamics of main macroeconomic variables and precise building of macroeconomic models. It is a well-known fact that the overall country's competitiveness and macroeconomic stability depends on the effectiveness of exchange rate policy. For export/ import companies it is important to know the extent of exchange rates and inflation's volatility, so to be able to predict loses or profits of a company. Inflation level plays a key role in country's financial ranking: countries with lower inflation rates are known to be more developed, industrialized and possess higher investment rating.

[1] During last five years according to National Bureau of Economic Statistics (http://www.statistica.md/index.php?l=en)

The remainder parts of the work are organized as follows. In the next section comprehensive theoretical and empirical literature review on exchange rate pass-through is presented. Theoretical background and methodology of estimation is provided in section three. The description of data can be found in section four. The main results and conclusions are presented in section five and six, respectively.

Chapter 2

LITERATURE REVIEW

Modeling and estimating the relationship between the exchange rates and prices, whether expressed in consumer/producer price indexes, import or export prices have been done since early 70-ties after Breton-Woods system of exchange rates collapsed. However, the theory and prerequisites for this study are dating back as far as to Cassel (1918), the first economist who popularized the law of one price and PPP theory of exchange rates and developed it in the form we observe it now.

There are two main motives to analyze the responsiveness of prices to exchange rate changes. The first one arises from the interest to explain the law of one price and PPP theory. The basic inference to which almost all the authors conclude is that even if the long-run relative PPP holds remarkably well with negligible deviations, there are substantial deviations from PPP theory in the short-run (Taylor, 1988; later Goldfajn and Werlang, 2000), giving birth to the so called purchasing power parity puzzle.[2]

The second motive is to estimate the impact of exchange rate fluctuations on current account, balance of payments. Many economists, as well as public authorities are worried about the relationship between exchange rate volatility and its influence on the trade balance through trade prices and volume.

[2] For more detailed examination of PPP theory the reader is adviced to address Rogoff (1995,1996), Friedman (1980), Krugman (1978), Taylor(1988), Dornbusch(1985) etc.

The fundamental theory of exchange rates and prices starts from the basic Keynesian monetary models, known as the IS-LM model for a closed economy and the Mundell-Flemming model for a small open economy.

Taylor (1995) and later Sarno and Taylor (2002) comprehensively summarize the literature of the economics of exchange rate, providing the discussion on recent developments in the theory, literature, recent works which study the exchange rates, foreign exchange markets' behavior.

The existing literature investigating the effect of exchange rates on prices started with Haberler (1949) as mentioned in Krugman (1986), and was restated by Dornbusch (1976, 1985, 1987), Fisher (1989). The principal monetary model, used in my paper is based on the theoretical work by Dornbusch (1976), where the first influential monetary model for small open economy with floating exchange rates is presented. This model incorporates such basic economic concepts as quantity theory of money, interest rate parity and purchasing power parity theory. The model is abstracted away from perfect market equilibrium condition and is the first macroeconomic model of exchange rate and prices, in which the rigidity of prices with rational expectations are combined.

While the early studies on ERPT are mostly theoretical works, the recent studies in the majority cases are empirical. The two types of recent research paper can be highlighted from the literature on ERPT: first category of works is done for groups of countries: on developed, developing or emerging countries, CIS countries, etc. The second group represents works of estimating ERPT separately by countries.

Developed countries. There is a great number of works, done on developed countries (for example, McCarthy (2000), Campa and Goldberg (2002), Ihrig et al. (2006)).

The paper McCarthy (2000) is noteworthy for its methodology in the literature of ERPT. The author develops three separate equations for import price, PPI, and CPI inflation as dependent variables. Each equation contains the expectation of an estimated variable itself based on the information, set at the end of the previous period; supply, demand, exchange rate shocks and mutually exclusive the import price, PPI, and CPI inflation shocks. Oil price inflation stands for supply shock, the output gap defines the demand shock, while the external shock includes both: supply, demand shocks and also exchange rate fluctuations. Using the multi-country panel regression study discovers insignificant impact of the volatility of exchange rate on prices for one group of developed countries (for example, Switzerland and Sweden), and the positive (significant) effect of the exchange rate changes on inflation for the other group of countries such as Japan, Belgium, France and Netherlands, where inflation rate was relatively higher among all the countries.

Campa and Goldberg (2002) estimated ERPT for 25 OECD countries using quarterly data from 1975 through 1999. Although the unweighed average of pass-through elasticity is about 46 percent over one quarter, and about 64 percent over the longer term, the results differ among countries considerably. Countries with higher exchange rate volatility have higher pass-through effect (for example, Germany with rates of pass-through into import prices equal to 60 percent in the short run and 80 percent in the long run against the United States with the lowest ERPT among OECD countries with rates equal to about 25 percent in the short run and 40 percent over the longer run).

Developing countries. Due to the lack of data on developing countries the number of papers studying the exchange rate pass-through in this group of countries is lesser than for developed economies. In this category can be

highlighted such works as Loungani and Swagel (2001), Barhoumi (2005, 2009), Alba and Papell (1998).

In Barhoumi (2009) the author broadens the classical approach of estimating ERPT, i.e. measuring correlation between nominal exchange rates and prices and focuses on fundamental macroeconomic shocks (such as supply or relative demand shocks, etc.) that affect both exchange rate and prices. The idea (firstly appeared in Shambaugh (2006)) behind this approach is that it is not so important to measure the effect of exchange rate on prices as such, how to reveal what macroeconomic shocks can affect exchange rate with further reflection in prices' change.

The other work, which is quite relevant for ERPT study in the Republic of Moldova, is Darvas (2001), where the relationship between exchange rate and inflation is estimated for EU candidate-countries. The main question of the paper is to find out the most appropriate exchange rate regime for inflation restraining. The authors find a negative relationship between exchange rate variability and pass-through effect. So far as the study shows that the exchange rate pass-through is higher when volatility of exchange rate is lower, the main conclusion states that the impact of exchange rate regime in a country is irrelevant, since under floating exchange rate regime, but in the period of low volatility, the pass-through effect is observed to be higher than under managed exchange rate regime.

Few words I would like to refer to emerging countries. In Ca' Zorzi et al. (2007) the results of ERPT for 12 emerging markets in Asia, Latin America, and Central and Eastern Europe turned out to contradict the common expectation that in 'emerging' countries ERPT is always higher than in "developed" countries. In fact, for emerging countries with lower inflation rates, (most notably the Asian countries), the ERPT was found to be low and similar to the levels of developed

economies. This evidence that exchange rate pass-through is smaller in countries with lower inflation is also supported by the findings of Ihrig et al. (2006), Goldberg and Knetter (1997). Korhonen (2005) studies the case of the exchange rate pass-through for CIS[3] countries, using vector autoregressive regressions, impulse functions and variance decompositions. Checking variables for stationarity and coming to the conclusion that there is no cointegrating relationship, the authors estimate vector autoregressive (VAR) models without error correction terms. The conclusions about ERPT were quite different among CIS countries: for example, for Kazahkstan and Russia the coefficients of ERPT were negative, while for Moldova and Armenia they were positive and the highest among CIS countires. In the later two countries this period was characterized by high exchange rate depreciation. In addition, these coefficients appeared to be higher for CIS countries than for the other emerging economies.

Besides works that estimate exchange rate pass-through for groups of countries, there exists a big variety of papers that examine exchange rate pass-through for individual countries. For Russia Dobrynska et al. (2005) applied two-step procedure of constructing Error Correction Model (ECM) using Johansen cointegration analysis at the first step. The authors found that a 50% of the PTE on consumer prices vanishes almost entirely within one month.

Before estimating results of ERPT for republic of Moldova, it is valuable to know the economic situation in its neighboring countries (most of which are CIS countries, such as Ukraine, Russian Federation), from which the economy of republic of Moldova is highly dependent. This dependence generally consists in bilateral trade of intermediate goods, as well as of finished goods. Thus, in the period between 2000 and 2009 the amount of import from Ukraine increased by

[3] Commonwealth of Independent States

1.5 times and amounts in average to USD 418732.4 thousand or 46.23 percent from all CIS countries, or 17.92 percent from total amount of import into republic of Moldova. (the highest amount among all CIS countries). Among the main export-destinated countries, Russian Federation takes the first position with amount of export from Republic of Moldova equal to USD 303475.8 thousand or 30.86 percent of total export from Republic of Moldova, following by Romania with 10,89 percent of total Export or USD 137549,0 thousand in real values. [4]

Significant bilateral trade with Romania, which is already a part of European Union with Ukraine, Russian Federation and other countries have an impact macroeconomic indicators of Republic of Moldova, especially on price level adjustment. For Romania, Gueorguiev (2003) and Cozmanca et al. (2009) estimate the exchange rate pass-through into import prices, producer prices and several different measures of consumer prices indices. The results reveal almost complete pass-through into import prices, which is in line to what the theory of PPP predicts, and incomplete pass-through into producer and consumer prices.

The ERPT for Ukraine, estimated by Bandura (2010), is equal to 14 percent for PPI and 9 percent for CPI aggregate indexes, which is lower than existing in literature 30 percent for developing countries.

Also, it should be mentioned that existing research can be classified by ERPT to what prices are used for evaluation. There is a big part of papers that concentrate on the effects of exchange rate changes on import prices, as in Goldberg and Knetter (1997). There are several works, which study PTE on producer and consumer prices (Dobrynska, 2005; McCarthy, 2000) and export prices (Cagnon

[4] Data obtained from National Bureau of Statistics. (http://www.statistica.md/category.php?l=en&idc=336&, External trade)

et al., 2007). There is no common opinion, which type of prices to use is the best or more information providing. One thing is obvious, fluctuations in imported goods prices can affect prices of goods, produced domestically through imported inputs and intermediate products leading to domestic inflation. McCarthy (2000) argues that consumer price indices can be changed by import inflation shocks 'through their affects on producer inflation'.

From technical point of view, there exist two methods to estimate ERPT. The first one is based on pass-through regression. The other and most popular one is the structural vector autoregression (VAR) methodology, firstly introduced by Christopher Sims (1972). According to Faruqee (2006) the main advantage of VAR procedure compared to single pass-through regression is that it permits identifying 'structural shocks (mainly through a Cholesky decomposition of innovations), affecting the system.

Since there are no papers done for the Republic of Moldova, the main goal of this work to assess the ERPT in the republic of Moldova, based on the existing literature and taking into account peculiarities of Moldavian economy.

Chapter 3

THEORETICAL BACKGROUND AND METHODOLOGY

As already mentioned, the main goal of the paper is to estimate exchange rate pass-through mechanism in the republic of Moldova and answer the question: 'How nominal exchange rates affect domestic prices in the country?' In the first part of this chapter theoretical base of ERPT is presented, while at the second part the methodology, used for empirical estimation, is described.

The theory of ERPT is based on the Quantity Theory in an Open Economy, the so-called 'four-way equivalence theorem' with floating Exchange rates, including Purchasing Power parity theory (PPP), Interest Rate Parity, expectations theory of exchange rates.

Let me briefly describe each of these concepts before passing to the monetary model, I use for the estimation.

Purchasing Power Parity Theory is the basic concept, which describes the relationship between exchange rates and price levels. Generally, it refers to the law of one price working at macro-level. The formula which corresponds to the 'the law of one price' can be expressed in the following way:

$$p_{i,t} = e_t * p^*_{i,t} \quad (1)$$

where $p_{i,t}$- the price of good i in the home country at time t ,e_t - home-currency price of foreign exchange; $p^*_{i,t}$-the foreign price of good i at time t. According to the equation, the absolute version of the LOOP[5] tells that the same good should

[5] Law of one price

cost the equal amount of money across countries if prices are expressed in terms of the same currency of denomination.

The existing a weaker relative version of LOOP explains the deviation between the prices of some good in the two countries and their exchange rate movements over a particular period of time t. It can be expressed with the following formula:

$$\frac{e_{t+1} * p^*_{i,t+1}}{p_{i,t+1}} = \frac{e_t * p^*_{i,t}}{p_{i,t}} \quad (2)$$

where $p_{i,t+1}$ -domestic price in the next period, $p^*_{i,t+1}$-foreign price in the next period, e_{t+1}- exchange rate of the next period.

The summation of all the traded goods or aggregate indicator in each country provides the absolute version of the PPP hypothesis:

$$\sum_{i=1}^{N} \alpha_i \, p_{i,t} = e_t \sum_{i=1}^{N} \alpha_i * p^*_{i,t} \quad (3)$$

where the weights in the summation satisfy

$$\sum_{i=1}^{N} \alpha_i = 1$$

Here the attention should be paid to the ambiguity or duality of PPP formulation: under fixed exchange rates prices should adjust and, on the contrary, under floating rates' regime, it is the exchange rate which adjusts to the long-run requirements of PPP. The PPP theory is based on the quantity theory of money and several assumptions, such as full-price flexibility, complete spatial arbitrage, no trade barriers and transaction costs. The violation of one of these assumptions can lead to violation of purchasing power parity or its incompleteness.

In general, econometric studies reveal that the volatility of relative prices is considerably lower than the volatility of nominal exchange rates and provide rejection of the LOOP for a very broad range of goods. Isard (1977) represents first attempt to estimate the LOOP for a number of traded goods and number of countries. The results received provide significant deviation from the LOOP and are highly correlated with exchange rate movements. Giovanni (1988) along with Pippinger and Phillips (1990), Fraser et al. (1991) prove the same outcomes.

The second concept- interest rate parity reflects the relationship between spot and forward exchange rates adjusted with interest rate. If the parity does not hold, one can earn risk-free return using an arbitrage opportunity.

Based on these economic fundamentals, the Dornbush (1976) monetary model, the first and most famous monetary model of exchange rates for small open economy was developed. This model is a theoretical framework of my research. The model can be described by several equations. First equation stands for uncovered interest rate parity, where i-nominal interest rate, i^*-real interest rate, π-the expected rate of depreciation of the domestic currency:

$$i = i^* + \pi \tag{4}$$

Second equation comes from purchasing power parity, so that the exchange rate is expected to adjust partially toward an equilibrium value $\bar{e}$.

$$\pi = \theta * (\bar{e} - e) \tag{5}$$

A function of specific form, used by Dornbush (1976), which comes from the function of the demand for money M=m (i, i^*, π) , is expressed as:

$$\frac{M}{P} = Y^{\varphi} * \exp^{-\lambda i} \tag{6}$$

or in logarithmic form:

$$m - p = \varphi y - \lambda i \tag{7}$$

Rearranging and substituting second equation (2) into four equation (4), we obtain the following relation:

$$p = \frac{\bar{e}-e}{\lambda\theta} + m + \varphi y - \lambda i^* \tag{8}$$

This is a key equation, which relates the level of prices to current exchange rates. Graphically, Dornbusch (1976) model can be represented in the following way:

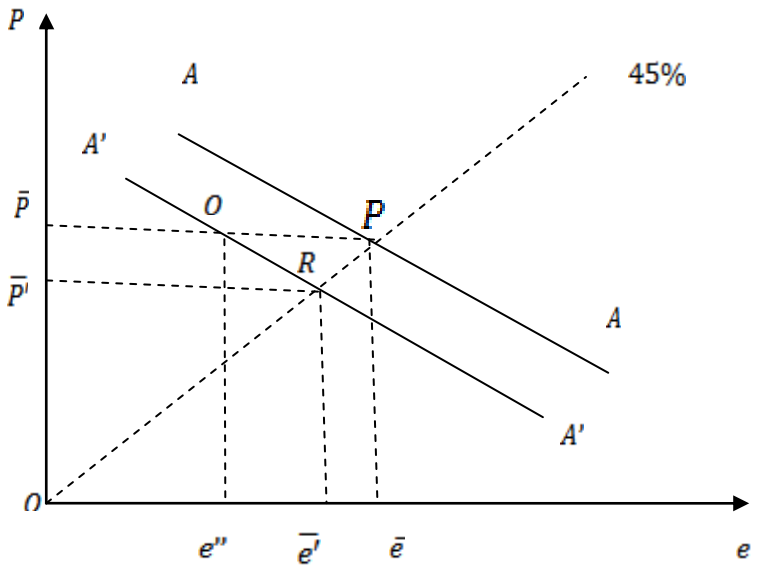

Figure 1. Graphical representation of Dornbusch (1976) Model.

In the graph above the vertical and horizontal axes stand for price level and exchange rate, respectively. The interrelation between prices and exchange rate is expressed by AA-line with equilibrium point P. The graph represents gradual adjustment of prices to exchange rate fluctuations. If prices were absolute elastic,

the same as money supply, and their adjustment was instantaneous, then interest rate would not change, because the real money supply is constant, and the exchange rate also would move immediately from one long-run equilibrium state to the other. However, in practice, due to price rigidities, fixed contracts, menu costs, money regulation and other factors in the short-run, there is no prices' response to shocks (in the paper as example is taken money supply reduction). Since prices do not respond to money supply reduction in the short period of time, real money supply goes down, leading to higher interest rate. Its growth attracts foreign capital inflows to the country, causing domestic currency devaluation, as the uncovered interest parity predicts. The short-run equilibrium is established, when expected rate of currency depreciation becomes equal to interest rate. During time, the prices are falling, formatting the new long-run equilibrium (point R).

3.1. EMPIRICAL METHODOLOGY

In the literature several econometric techniques are used to study ERPT. The most frequently applied methods include standard single-equation regression estimation, VAR (vector autoregression model), introduced by Christopher Sims (1972) or VEC (vector error correction model allowing for cointegration between variables) introduced by Engle and Granger (1987). The latter two methods are the most widely used during the last two decades. The VAR procedure has several advantages compared to a single–equation regression. Firstly, it allows defining not only absolute pass-through but also causal relationship between the variables, identifying specific 'structural' shocks influencing the system (Faruqee, 2004; Ito and Sato, 2006). In the second, VAR procedure is applied to estimate bi-lateral causation between variables. This is realized by using post-VAR estimating procedure such as impulse response functions and variance decompositions. This is in line to what the theory of purchasing power parity predicts. In the case of estimating pass-through effect, it is more relevant to estimate both exchange rate effect on prices and prices on exchange rate influence. 'Bi-directional causal relationship' is the fact established by the number of scientific publications (for example, Ito and Sato (2006), Engel and West (2005)).

The reduced form of VAR can be expressed as:

$$Y_t = A_1 Y_{t-1} + \cdots + A_p A_{t-p} + u_t, \quad (9)$$

where $Y_t: (y_{1t}, \dots, y_{kt})'$ is a (k×1) random vector; $A_j (j = 1, \dots, p)$ are (k×k) coefficient matrices, with p-the order of the VAR model; u_t- is a k-dimensional white noise process with $E(u_t)=0$, $E(u_t, u_t')=\sum u$ – matrix of innovation terms.

Each of the variable is regressed on each variable past values.

In the case of stationarity, the following two conditions imply:

$$Y_t = \sum_{j=0}^{\infty} G_j u_{t-j},\ G_j = \sum_{i=1}^{j} G_{j-1} A_i, \text{ where}$$

matrix G is the function of the original matrices A, which sums up the effect of unit shocks on the variables.

Or, for non-singular k×k matrix N should hold:

$$Y_t = \sum_{j=0}^{\infty} G_j N N^{-1} u_{t-j} = \sum_{j=0}^{\infty} \Psi_j \varepsilon_{t-j}, \quad (10)$$

where $\varepsilon_{t-j} = N^{-1} u_{t-j},\ \Psi_{t-j} = G_j N (j = 0,1,2, \dots)$

So, the structural form of the VAR Model can be expressed as:

$$N^{-1} Y_t = N^{-1} A_1 Y_{t-1} + \cdots + N^{-1} A_p Y_{t-p} + N^{-1} u_t, \quad (11)$$

or in a compact form: $\Gamma_0 Y_t = \Gamma_1 Y_{t-1} + \cdots + \Gamma_p Y_{t-p} + \varepsilon_t, \quad (12)$

Matrix Γ_0 allows for modeling instantaneous relationships, where $\Gamma_0 = N^{-1}$, $\Gamma_j = N^{-1} A_j\ (j = 1, \dots, p)$. As can be seen, the errors in the reduced-form VAR u_t are composites of the underlying structural shocks ε_t: $u_t = A^{-1} N \varepsilon_t$. The contemporaneous causal structure defines choice of $N(\Gamma_0)$.

It is quite important to impose required restrictions to define reduced form VAR, either by using Choleski decomposition (such that N is lower triangular and $\Omega = E(\varepsilon_t \varepsilon_t') = I_k$), or by imposing a priori economical theoretical zero and non-zero restrictions. Since Σ is symmetric, it contains only $(n^2 + n)/2$ distinct elements, while SVAR contains n^2-unknowns. It is therefore necessary to impose

at least $n^2 - \left((n^2 + n)/2\right) = (n^2 - n)/2$ restrictions on the structural model, where n denotes the number of endogenous variables.

After estimating VAR model, impulse-response function, as well as variance decompositions can be used to assess the speed and extent of the pass-through by looking at the response of inflation rate to an impulse in exchange rate and vice verse.

Chapter 4

DATA AND DESCRIPTIVE ANALUSIS

The research is going to examine the exchange rate pass-through to various prices in the Republic of Moldova. The choice of the dataset is guided by the theoretical background, previous literature experience and data availability for the republic of Moldova. The analysis is based on monthly data covering the period between 2000M01 and 2010M12 for CPI and PPI and their components. The variables used include:

CPI: Consumer price indices. The CPI index, which includes total index and disaggregated components, published by National Bureau of Statistics of Republic of Moldova are used. The series are normalized (considering Dec1999=100) and transformed into logarithm. This transformation does not change the path of the variables and, hence, is completely in line with the theory.

It would be easier to restrict estimation to the effect on aggregated CPI only, however, since there is no monthly data on indices of import/export goods, estimating ERPT effect on disaggregated data of CPI will give the possibility to analyze the scale of ERPT on imported, exported and domestically produced groups of goods separately. The plots on the data reflect high seasonal pattern on most categories of goods, so seasonal adjustment is the main remedy in this case. The data on CPI is adjusted with X-12 procedure in EViews 6.0 to remove seasonal effects from a time series in order to better reveal non-seasonal features.

PPI: Producer price indices. The PPI index (disaggregated into major industry groups) published by National Bureau of Statistics of Republic a Moldova is used.

The series are normalized (considering Dec 1999=100) and transformed into logarithm. The data on PPI is also seasonally adjusted.

Exchange rate: Though in the literature different variations of exchange rates are applied, I follow the majority of existing works and use nominal effective exchange rate (henceforth, NEER). This choice I also can explain by the fact, that the economy of Moldova is not matched to a singular currency. Although non-cash Foreign Exchange Market turnover is still mainly represented by US Dollars (62.64 percent in March, 2011)[6], following by Euro currency (the percentage of which has doubled from 13.56 percent in March 2005 to 33.94 percent , observed in March, 2011), cash foreign exchange market[7], on the contrary, mainly consists of Euro (59.7 percent in April, 2011), following by US Dollar (32.4 percent in April, 2011) and RUB ruble (6.7 percent).Thus, the NEER, weighted average value of a country's currency relative to a basket of other currencies is the most appropriate measure of exchange rate. The primary source of data is International Financial Statistics, series code 92 NECZF.

Following theoretical framework and empirical studies in order to catch the potential impact of other variables on inflation, it would be correctly to include such variable as money supply, Output gap, interest rate.

Money supply M2: Choosing between Money Supply M1 and M2 (which are more frequently used in the literature) I acted on the premise that the Republic of Moldova represents a high dollarized country with high amount of capital, concentrated on the households' deposit accounts. M2 money aggregate includes money in circulation, current account balances and demand deposits in local and

[6] http://www.bnm.md/en/fm_valute_market

[7] http://www.bnm.md/en/cash_valute_market

foreign currencies. Formally, M2 aggregate is equal to money base times the money multiplier. The M2 data is taken from IMF International Financial Statistics and is already seasonally adjusted. The data used is monthly and is represented in millions, national currency.

Since economic activity is a key factor in determining the fluctuations in price indices and exchange rates (for instance, during economic growth, domestic currency, as usual, appreciates, but during economic recession it has tendency to depreciate), I include output gap to capture this fact.

Output gap: The data on GDP is provided only quarterly. In the literature different tricks can be found how to bypass such data imperfection. There are examples of using different proxies for GDP level: Dobrynska (2005) for Russia uses real consumption, there are few examples of using industrial indices (Bandura (2010) for Ukraine), nominal average salary. Using different proxies for GDP is explained by high correlation between output level and these variables. Due to incomplete data for proxy variables, I use the second approach-data interpolation. For this purpose there are two commonly used methods: the quadratic method and the cubic spline method. I use the later, since it gives more smooth interpolated time series. Then Hodrick-Prescott filter is applied to obtain detrended data, which stands for output gap.

Oil price: Price of oil is the spot price of crude oil on New-York Mercantile Exchange (NYMEX), provided by Bloomberg. As far as the Republic of Moldova is quite dependent on energy resources, imported from abroad, the increase in world oil prices has tendency to diminish domestic disposable income, companies' profitability along with exchange rate depreciation.

Interest rate: The inclusion of the interest rate is explained by the interest rate parity from equation (4). High interest rates discourage spending, thus increasing

savings with appreciation of the national currency. The appreciation of the national currency can stimulate imports and decrease exports. Due to periodic data missing for money market rate (is often used in the literature) and on the assumption of high dollarization ratio and in terms of liabilities through banking system, I will use deposit rate.

Descriptive statistics of explanatory variables is presented in Table 1, descriptive statistics of CPI and PPI, separately, by category is represented in Tables 2 and 3, respectively. There is clearly observed trend of CPI growth over the analyzed period. Within the components structure, prices on consumer foods and services tripled from the beginning of 2000 till the end of 2010. The most vulnerable to inflation processes are first-necessity goods and goods engaged in export-import operations. According to the Annual Report of the NBM[8] the predominant sectors in the structure of exports are food and agricultural products – with a share of 47.3 percent (2009) and textiles and articles thereof - with a share of 20.0 percent (2009). The most important categories of the imported goods were: petroleum oils; chemicals, wires, cables, textiles and textile articles, electrical insulators and insulating fittings of any material. Besides the internal factors, the increase of foodstuff prices was determined by the increase of global foodstuff prices, increasing in December 2010 with about 24.6 percent compared with the same period of previous year.

The similar situation is observed for PPI. Most vulnerable production processes to inflation are: electricity and heat, gas and water supply, total manufacturing industry, mining and quarrying. The inputs for electricity and gas supply industries are almost all imported (natural gas is imported from JSC 'Gazprom' of the Russian Federation, 76 percent of energy is imported from Ukraine,

[8] http://www.bnm.md/en/monetary_policy_report

Transnistria). Since most of the fuel and energy resources are imported, the prices for this category of good are set externally. Due to this reason since 2010 NBM has started to target core inflation[2], not base inflation, explaining this fact by inability of monetary policy to affect uncontrollable by NBM inflation processes. Concerning the control variables, in December 2010, money supply (M2) achieved MDL 24.470 mln, compared to MDL 20.942 mln, observed in the previous year with the growth rate of 16.84 percent annually.[9] The growth rate of monetary aggregates is higher than the growth rate of GDP, which is a signal of money overabundance in the economy, and this difference spills over into inflation.

At the oil market, there is observed an upward trend from 2000 till 2008, achieving peak in the middle of 2008 with further steep drop at the beginning of 2009 corresponding to the 'height' of the World Financial Crisis. In the republic of Moldova the period between 2008 and 2010 is distinguished for marked drop in prices for CPI and PPI. This period is also characterized by noticeable output decline, political instability in the country, change of political power.

[9] The statistics obtained from the official cite of CBM: www.bnm.org

Chapter 5

EMPIRICAL ANALYSIS

This chapter consists of several parts: the first part refers to the model estimation and its description for all disaggregated goods of CPI and PPI. Such a comprehensive studying is done to reveal the most liable to pass-through effect industires in the Republic of Moldova. In the subsequent parts I focus on thorough analysis of ERPT only for the CPI aggregated and its main groups (foodstuff products, non-foodstuffs, total services) and for the aggregated PPI.

The empirical analysis started with data refinining. Firstly, all data was checked for stationarity of the time series with unit root tests. I test whether the assumed time series are I (1). To do that I employ the very standard Augmented Dickey-Fuller test (ADFt) and Durbin's test for autocorrelation to prove the validity of the results. First, I test for the unit roots in the cases when intercept and trend is present in the regression, then when there is the intercept only, and finally without intercept and trend. If I am not able to reject the null hypothesis about the unit root I run the ADF test on the first differences of the original time series.

In the majority cases the results, as expected, reveal that most of time series of consumer/producer price indices and exchange rates in the republic of Moldova are nonstationary.[10] Therefore, the time series data should be taken in differences. The results of ADF test for time series for regressors and regressands are represented in Tables B1 and B2 in Appendix B for CPI and PPI, respectively, and in Table B3 for control variables.

[10] In some cases for particular categories of goods the null hypothethis of nonstationarity was rejected. But its statistical significance was marginal. So to be consistent with the whole research, I used all the variables in differences.

After checking for the order of integration for individual variables, the order of cointegration between the set of variables is checked. The cointegration analysis started from the Stock and Watson (1988), which first presented the idea, that if examining variables share common stochastic trend then they are cointegrated. Such a relationship between variables can have a side effect on their mutual behavior. In the literature of ERPT Dobrynska (2005), as well as Bandura (2010) for Ukraine use VECM due to observed cointegration between variables, Korhonen (2005), Campa and Goldberg (2002) estimating ERPT in CIS countries and finding in most of studying cases no cointegration, did not apply error correction model.

There exist two tests which estimate if variables are integrated. First one was developed by Engle and Granger (1987) and Granger (1988) and the second was developed by Johansen (1988). Both tests reveal no cointegration. The results are presented in Table C1 for CPI by category and in Table C2 (Appendix C) for PPI by category.

Since the data checking for unit root test, turned out to be non-stationary and there is no cointegration between variables, so VAR in differences is the most appropriate procedure for estimating ERPT.

For this purposes, the set of two equations is estimated:

$$\Delta\pi_t = \alpha_1 + \sum_{i=1}^{m} \alpha_{11}(i) * \Delta\pi_{t-i} + \sum_{i=1}^{m} \alpha_{12}(i) * \Delta EX_{t-i} + \sum_{i=1}^{m} \alpha_{13}(i) * \Delta it+i=1m\alpha14i*\Delta Xt-i+\varepsilon 1t\pi \text{ , (13)}$$

$$\Delta EX_t = \alpha_2 + \sum_{i=1}^{m} \alpha_{21}(i) * \Delta EX_{t-i} + \sum_{i=1}^{m} \alpha_{22}(i) * \Delta\pi_{t-i} + \sum_{i=1}^{m} \alpha_{23}(i) * \Delta it+i=1m\alpha24i*\Delta Xt-i+\varepsilon 2t\pi \text{ , (14)}$$

where π- inflation level, EX-exchange rate, i-interest rate, X- control variables (output gap, money supply, interest rate, world oil prices)

The theory predicts negative correlation between appreciation of exchange rates and level of inflation: appreciation leads to lower level of inflation, while depreciation, on the contrary, has tendency to promote inflation growth. However, sometimes the sign is ambiguous: in the case of low inflation environment (Gagnon and Ihrig (2004), Taylor (2000)), there is observed opposite relation between exchange rate and inflation. Strengthening in economic activity, proxied by output gap, leads to higher inflation while weaker activity causes lower inflation. The sign of the coefficient for deposit interest rate should be negative. Higher interest rates lead to higher propensity to save, thus decreasing consumption and decelerating inflation process. The increase in money supply is often called 'monetary inflation'. So the relation between money supply and inflation should be positive. Oil is the major input of the economy. Imagine, if its price rises, the cost of production, in which it is engaged automatically rises as well. The inflation from inputs by chain transfers to the inflation of the end products.

The number of time lags for each type of indices was determined individually, using specific selection criteria: Akaike Information Criteria, Hannan Quinn, Schwarz Criterion, Likelihood ratio test, which gives the lags that produce best fit and statistically significant coefficient estimates. The results of lags selection are not presented in the separate table due to space savings and can be observed in the table of VAR model estimation (Appendix D).

The results of VAR estimation is presented in Table D1 (Appendix D) for CPI and Table D2 for PPI. I would like to discuss the obtained results separately by groups of PPI and CPI.

The ERPT for aggregated CPI is almost equal to 10 percent after the first month; this is in line with the literature for Commonwealth of Independent States (CIS) countries. For comparison, ERPT in Russia, estimated by Dobrynska (2005) is equal to 21 percent for the period 1995 till the end of 2002, for Ukraine (Bandura, 2010) it is equal to 9 percent for the period between 2000 and end of 2009. However, in comparison with the result of CPI, obtained by Korhonnen (2005) for Moldova, which is equal to around 40 percent before 2002, it has declined almost by four times, which is quite explained variation, since the level of inflation and its fluctuation has decreased dramatically during last five years.

Out of CPI categories, the most responsive to the exchange rate shocks are non-foodstuff products and services, which are mostly non-tradables. Also, there is a pattern that ERPT is higher for goods, mostly involved in export-import operations: margarine fats (around 82 percent), vegetables (around 67 percent), and grapes (35 percent) - all those sectors with high share of exporting. The ERPT on non-foodstuff products is equal to 43 percent instantaneous effect and 34 percent in two months. Among the non-foodstuff products the highest effect of ERPT is observed on fancy goods, carpet, freezers and refrigerators, construction materials, medicaments, TV sets, those goods, which are mostly imported or are produced from the imported semi-finished products. Although such categories of goods as citrus fruits, fruit juice among foodstuffs and cars, washing machines, cosmetics and perfumery among nonfood stuffs are also mostly engaged in export/import operations, the ERPT is negligible for these groups of goods. This fact is supported by Krugman's (1986) 'pricing-to-market' concept, which means that sellers adjust their prices in the expectation of future exchange rate volatility. As it is stated in Mann (1986) and later in McCarthy (2000) 'expectations of greater exchange rate volatility may make importers more wary of changing prices and more willing to adjust profit margins, thus reducing measured pass-through'.

What important is to notice is that typically for all categories of goods consumed the higher pass-through effect is observed through the monetary channel (equal to 13.8 percent after 2 lags for total CPI) rather than through exchange rate channel or interest rate channel. As already was mentioned, during the last years monetary aggregates have experienced high growth in nominal terms and continue to rise. The main explanation to this fact is that monetary aggregates in the republic of Moldova are strongly influenced by the domestic foreign exchange market: its high amount of foreign currency flows and exchange operations. This causes high pressure on the exchange rate and , which by turn leads to inflation pressure.

Out of 19 groups of PPI, the ERPT turned out to be significant only for 4 components of PPI. These four groups are also distinguished for the highest ERPT effect: mining and quarrying with 28.3 percent instantaneous pass-through effect; manufacture of textiles with 39 percent (instantaneous effect), manufacture of wearing apparel, dressing and dying of furs with 28.8 percent, manufacture of rubber and plastic products with 30 percent of ERPT.

In VARs the direction of causality can be tricky, and cannot really be ascertained by just looking at coefficients. In theory, if the purchasing power parity holds, it can be both prices and exchange rate which adjust. And it can be that prices react first. One needs to look at impulse response function, variance decomposition and Granger causality tests. The rest of the chapter concentrates on post-VAR estimation procedures only for the aggregate CPI index and its main subgroups (foodstuffs, non-foodstuff products, total services) and total PPI.

Impulse-response function is used to assess the speed and extent of the pass-through: it shows the estimated response of price index to an impulse in the exchange rate. The impulse responses (non-accumulated and accumulated) of the

CPI indices to an exchange rate shock are represented at Figure 1, covering time period of ten months.[11]

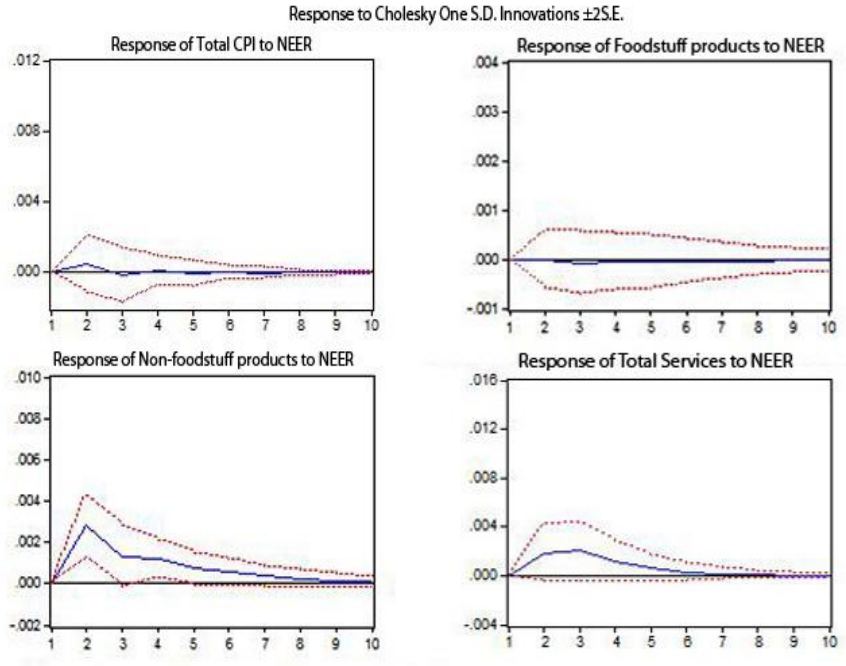

Figure2. Impulse-response of consumer prices to a 1 unit in Exchange Rate Growth.

Note: In this and subsequent figures the dashed line stands for confidence interval (The asymptotic normal distribution confidence interval on a nominal coverage of 95%).

The depreciation of exchange rate causes all price indices, except for foodstuff products, react positively with further diminishing effect. Accumulated impulse for CPI attains its maximum between second and third months. The speed of reaction is higher for the aggregated CPI and the effect from the exchange rate shock drops out in 2.5 months, while for non-foodstuff products and total services it vanishes in 9 and 6 months, respectively. An impressive result is observed on foodstuff products, which displays marginal negative deviation of index from the trend due to the exchange rate shock.

[11] Although in some literature works one can find Impulse response function estimated in levels, even if VAR was done in differences (McCarthy,2000),to be consistent I estimate impulse response function in differences.

Comparing impulse-response functions of PPI (Figure 2) and CPI, the reaction of PPI to exchange rate shock is more prolonged than of CPI and the peak is observed at the third month.

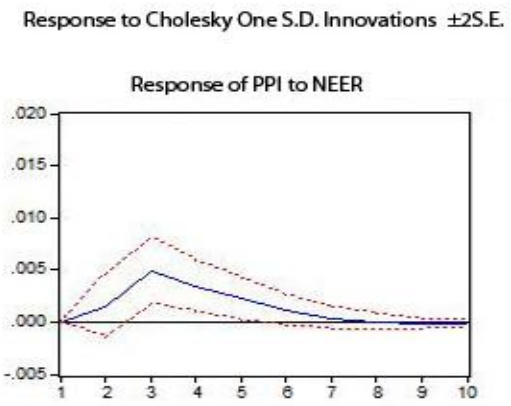

Figure 3. Impulse-response of PPI to a 1 Unit in Exchange Rate Growth.

The table below reports the results of impulse-response function in terms of figures.

Table 1. Exchange rate pass-through into price indices from Impulse-Response function.

	Time Frame					
Price Index	1M	2M	3M	4M	5M	6M
CPI total	0.9139	0.0955	0.3112	0.0655	0.1067	0.0324
Foodstuff products	0.3442	0.1846	0.1702	0.1287	0.1054	0.0839
Nonfoodstuff products	0.332	0.156	0.1667	0.0641	0.0548	0.0325
Services	1.28	0.5876	0.1883	0.0714	0.0408	0.0254
PPI Total	0.3083	0.521	0.3238	0.0864	-0.0378	-0.0681

If impulse-response shows short-run effect of ERPT, the accumulated impulse response stands for long-run deviations. Accumulated impulse responses at time t are obtained by summing up all impulse responses from 0 to t.

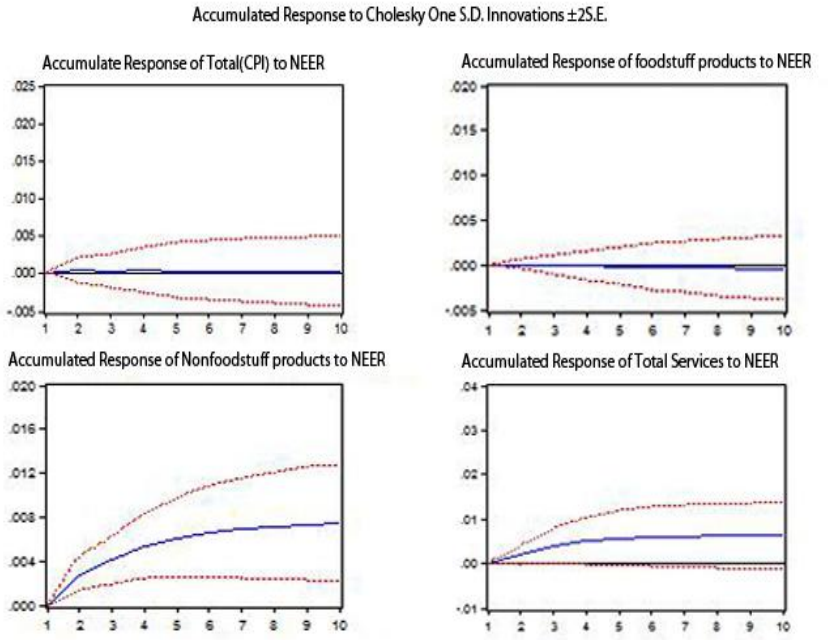

Figure 4. Accumulated impulse responses of consumer prices to a 1 Unit of exchange rate growth.

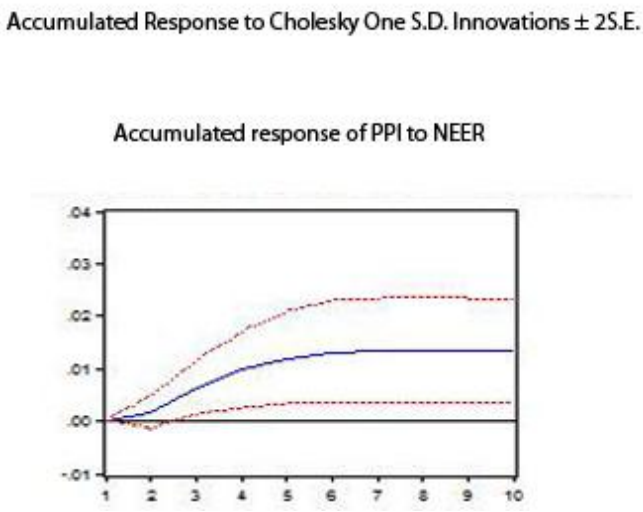

Figure 5. Accumulated impulse response of PPI to a 1 Unit of exchange rate growth.

Several features are noteworthy from the Figures 3 and 4 of accumulated response: for total CPI and foodstuff positive deviation to exchange rate shock is neutralized by the negative deviation such that cumulative response is balanced. The ERPT for nonfood stuffs, services and PPI is observed at an ever-increasing rate.

Although the impulse-response function shows the extent and the speed of pass-through effect, the deviation of price level due to one percent exchange rate shock (or how exchange rate variance is transferred to inflation variance) can be captured by applying Variance decomposition technique.

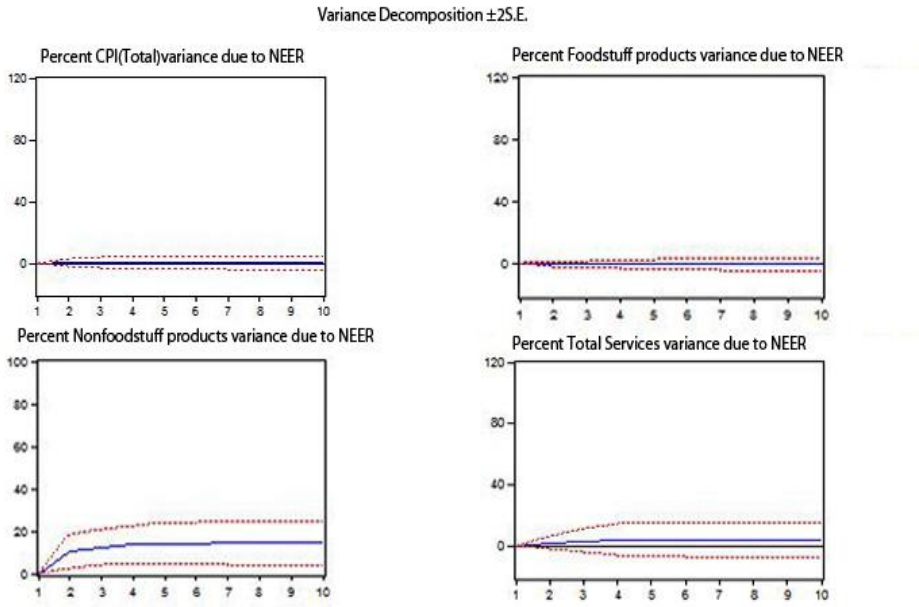

Figure 6. Variance Decomposition for consumer prices.

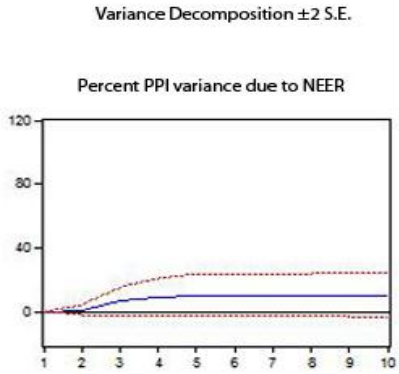

Figure 7. Variance Decomposition for PPI.

The graphs from Variance decomposition reveal negligible elasticity of aggregated CPI, particularly, the smallest sensitivity is observed on foodstuff products, however evident effect is observed on non-foodstuff products, services and producer price indices.

The next part of the chapter reports the results of the Wald test, commonly used to test for Granger causality. The estimation technique started from the paper Granger (1969) has been widely adopted in the literature of ERPT. It tells that in a VAR model, under the null hypothesis that variable exchange rate does not Granger cause variable inflation, all the coefficients on the lags of variable 'exchange rate' will be zero in the equation for variable 'inflation' and , on the contrary, will be zero on the lags of variable 'inflation' for the variable 'exchange rate'. The results from Granger causality are presented in Table 3 below.

Table 2. The results from Granger Causality Wald Test.

Equation	Excluded	Prob>chi2
Total CPI	NEER	0.071
NEER	Total CPI	0.053
Foodstuffproducts	NEER	0.681
NEER	Foodstuffproducts	0.078
Non-foodstuff products	NEER	0.583
NEER	Non-foodstuff products	0.105
Services(Total)	NEER	0.063
NEER	Services(Total)	0.600
PPI(Total)	NEER	0.498
NEER	PPI (Total)	0.000

It is evident, that exchange rate shock is a cause of total CPI index change, particularly, and such relationship is a characteristic feature for price index on total services.

It is also interesting to observe the bi-lateral causation between inflation and exchange rate, as was early mentioned is quite frequent situation, observed in the literature of exchange rate- inflation relationship.

Chapter 6

CONCLUSION

In the case when the republic of Moldova has passed to the monetary inflation-targeting policy, the question of which monetary policy channels are most important and suitable for scotching inflation arises. This research is the first attempt to measure the relationship between exchange rate and inflation in the republic of Moldova, i.e. exchage rate pass-through. The main monetary model which lies behind this study is the Dornbush (1976) model of exchange rates for small open economy. The model is constructed base on the quantity theory of money, purchasing power parity, and interest rate parity theories. The econometric technique, applied to estimate ERPT is vector autoregression (reduced form VAR), received from structural vector autoregression by using Cholesky decomposition. Additional post-VAR estimation techniques have also been applied, such as Impulse-Response function, Variance decomposition and Granger causality test.

The observed results indicate high speed of the ERPT (pass-through effect vanishes almost within three to six months, in average), high exchange rate pass-through on non-foodstuff products, services (21.8 percent of ERPT) and goods of first priority (for example, medicaments with ERPT equal to 5.6 percent). Such situation has a negative effect on most vulnerable sectors of the society. One of my main recommendations would be to temporally suspend floating exchange rate regime and concentrate on the money supply reduction. The other important fact is that it is observed bi-directional causality between prices and exchange rate through Granger causality test. This can be explained by high level of inflation in period between 2000 and 2005. Also, as in the previous literature mentioned, such situation is typical for countries with undeveloped financial market with high

dependence on foreign markets (Gigineishvili, 2007), developing countries (Ganguly and Breuer, 2010) and also, in countries with high import share. Although the republic of Moldova is heavily dependent on import consumption, the pass-through on some totally imported goods is negligible. This can be attributed to the 'pricing-to-market' behavior of firms-distributors, signaling of insufficient market competition and regulation.

Nevertheless that the NBM has already moved from monetary aggregates targeting, the inclusion of money supply (M2) gives the opposite evidence: monetary transmission mechanism is still predominant over exchange rate pass-through, which makes the policy of stable prices insufficient. The main remedy would be monetary aggregates cutting and the range of macroeconomic reforms, particularly, monetary and credit policy tightening. The range of reforms should also be implemented in real sector of the economy to replace foreign factors of production by domestic and increase the output of domestic industry.

WORKS CITED

Alba, Joseph D., and Papell David. 1998. Exchange Rate Determination and Inflation in Southeast Asian Countries. *Journal of Development Economics*, 55, 421-437.

Bandura, Pavel. 2010. A Study of Exchange Rate Pass-Through in Ukraine. In Master Thesis in Economics. Kyiv School of Economics.

Barhoumi, Karim. 2009. Exchange Rate Pass−Through Into Import Prices In Developing Countries: An Empirical Investigation. Economics Bulletin, Vol. 3, No. 26 pp. 1−14

Ca' Zorzi, Michele, Elke Hahn, and Marcelo Sanchez. 2007. Exchange Rate Pass-Through in Emerging Markets. Working Paper Series 739. European Central Bank.

Cagnong, Joseph E., and Jane Ihrig. 2001. Monetary Policy and Exchange Rate Pass-Through. International Finance Discussion Papers 704, Board of Governors of the Federal Reserve System (U.S.).

Campa, Jose Manuel, and Linda S. Goldberg. 2002. Exchange Rate Pass-Through Into Import Prices: a Macro or Micro Phenomenon? Staff Reports 149, Federal Reserve Bank of New York.

Campa, Jose Manuel, and Linda S. Goldberg. 2004. Exchange Rate Pass-Through into Import Prices. CEPR Discussion Papers 4391.

Cassel, Gustav. 1918. Abnormal Deviations in International Exchanges. *Economic Journal*. Vol. 28.pp. 413-15.

Choudhri, Ehsan U., Faruqee, Hamid, and Dalia S. Hakura. 2005. Explaining the Exchange Rate Pass-Through in Different Prices. *Journal of International Economics*, Elsevier, vol. 65(2):349-374, March.

Cozmanca, Bogdan-Octavian, and Florentina Manea. 2009. Exchange Rate Pass-Through into Romanian Price Indices. A VAR approach. Working Papers of Macroeconomic Modelling Seminar 092102, Institute for Economic Forecasting.

Dalia Hakura, and Ehsan U. Choudhri. 2001. Exchange Rate Pass-Through to Domestic Prices: Does the Inflationary Environment Matter? IMF Working Papers 01/194, International Monetary Fund.

Darvas Zsolt. Exchange Rate Pass-Through and Real Exchange Rate in EU Candidate Countries. National Bank of Hungary.

Devereux, Michael B, and Lane, Philip R. 2001. Exchange Rates and Monetary Policy in Emerging Market Economies. CEPR Discussion Papers *2874*.

Dobrynskaya Viktoria, and Levando Dmitriy. 2005. A Study of Exchange Rate Pass-Through in Russia. In *HSE Series Research in Economics and Finance.* Moscow: Higher School of Economics.

Dornbusch, Rudiger. 1976. Expectations and Exchange Rate Dynamics. *Journal of Political Economy, University of Chicago Press,* vol. 84(6), pages 1161-76, December.

Dornbusch, Rudiger. 1985. Purchasing Power Parity. NBER Working Papers 1591, National Bureau of Economic Research, Inc. Dynamics and Control 12, 231-254.

Engel, Charles and West, K.D. 2005. Exchange Rate and Fundamentals. *Journal of Political Economy*, 84, pp. 485-517.

Faruqee, Hamid. 2006. Exchange Rate Pass-Through in the Euro Area. IMF Staff Papers, Vol. 53, pp.63–88.

Fisher, Eric. 1989. A model of Exchange Rate Pass-Through. *Journal of International Economics*, Elsevier, vol. 26(1-2), pages 119-137, February.

Frankel Jeffrey A., David C. Parsley, and Shang-Jin Wei, 2005. Slow Passthrough Around the World: A New Import for Developing Countries? NBER Working Papers *11199*, National Bureau of Economic Research, Inc.

Fraser, Patricia, Mark P. Taylor, and Alan Webster. 1991. An Empirical Examination of Long-Run Purchasing Power Parity as a Theory of International Commodity Arbitrage. *Applied Economics*, 23 (11): 1749-1759.

Frederic S. Mishkin. 2008. Exchange Rate Pass-Through and Monetary Policy. NBER Working Papers 13889, National Bureau of Economic Research, Inc.

Friedman, Milton. 1980 Prices of Money and Goods across Frontiers: The Pound and Dollar over a Century. *The World Economy* 4:1, 497-511.

Ganguly, Srideep, and Janice Boucher, Breuer. 2010. Nominal Exchange Rate Volatility, Relative Price Volatility, and the Real Exchange Rate. *Journal of International Money and Finance, Elsevier*: vol. 29(5):840-856, September.

Gigineishvili, Nick. 2007. In Search of Monetary Transmission in Moldova. IMF Working paper.

Giovanini, Alberto. 1988. Exchange Rates and Traded Goods Prices. *Journal of International Economics* 24: 45-68.

Goldberg, Pinelopi K., and Michael M. Knetter. 1997. Goods Prices and Exchange Rates: What Have We Learned? *Journal of Economic Literature*, 35 (3): 1243—1272.

Granger, Clive W.J. 1969. Investigating Causal Relation by Econometric and Cross-Sectional Method. *Econometrica* 37: 424–438.

Granger, Clive W. J. 1988. Causality, Cointegration, and Control. *Journal of Economic Dynamics and Control*, Elsevier, vol. 12(2-3), pages 551-559.

Gueorguiev, Nikolay. 2003. Exchange Rate Pass-Through in Romania. International Monetary Fund (IMF) June 2003. IMF Working Paper No. 03/130

Haberler, Gottfried. 1949. The Market for Foreign Exchange and the Stability of the Balance of Payments: A Theoretical Analysis. *Kykios*, 3, 193-218.

Isard, Peter. 1977. How Far Can We Push the "Law of One Price"? In *The American Economic Review (AER),* 67(5), 942 - 48.

Ito, Takatoshi, and Kiyotaka Sato. 2006. Exchange Rate Changes and Inflation in Post-Crisis Asian Economies: VAR Analysis of the Exchange Rate Pass-Through. Discussion papers 06018, Research Institute of Economy, Trade and Industry (RIETI).

Johansen, Soren, 1988. Statistical Analysis of Cointegration Vectors. *Journal of Economic Dynamics and Control*, Elsevier, vol. 12(2-3), pages 231-254.

Kenneth, Froot A. and Kenneth Rogoff. 1996. Perspectives on PPP and Long-Run Real Exchange Rates. NBER Working Papers 4952, National Bureau of Economic Research, Inc.

Kevin Ross. 1998. Post Stabilization Inflation Dynamics in Slovenia. IMF Working Papers 98/27, International Monetary Fund.

Korhonen, Iikka, and Paul Wachtel. 2005. A Note on Exchange Rate Pass-Through in CIS Countries. BOFIT Discussion Papers. Bank of Finland, BOFIT Institute for Economies in Transition.

Krugman, Paul R. 1978. Purchasing Power Parity and Exchange Rates. *Journal of International Economics,* Vol. 8, pp. 397-407.

Krugman, Paul.1986. Pricing-to-Market when the Exchange Rate Changes. NBER Working Papers 1926, National Bureau of Economic Research, Inc.

Loungani, Prakash, and Phillip Swagel. 2001. Sources of Inflation in Developing Countries. IMF Working Papers 01/198, International Monetary Fund.

Lucio, Sarno, and Mark P. Taylor, 2002. Purchasing Power Parity and the Real Exchange Rate. IMF Staff Papers*, Palgrave Macmillan Journals*, vol. 49(1), pages 5.

Mann, Catherine L. 1986. Prices, Profit Margins and Exchange Rates. Federal Reserve Bulletin 72:366-379.

McCarthy, Jonathan. 2000. Pass-through of Exchange Rates and Import Prices to Domestic Inflation in Some Industrialized Economies. Staff Reports 111, Federal Reserve Bank of New York.

Menon, Jayant. 1995. The Relationship between the Law of One Price and Exchange Rate Pass-through. *Economia Internazionale / International Economics, Camera di Commercio di Genova,* vol. 48(4), pages 551-568.

Peter Doyle, G. Jiang, and Louis Kuijs. 2001. Real Convergence to EU Income Levels: Central Europe from 1990 to the Long Term. IMF Working Papers 01/146, International Monetary Fund.

Philippe Bacchetta, and Eric van Wincoop. 2001. A Theory of the Currency Denomination of International Trade. Working Papers 01.07, Swiss National Bank, Study Center Gerzensee.

Pippenger, John, and Llad Phillips. 1990. Some Pitfalls in Testing the Law of One Price in Commodity Markets. *Journal of International Money and Finance*. 27(6): 915-925.

Robert, F. Engle, and Clive W. J. Granger. 1987. Co-integration and Error Correction: Representation, Estimation, and Testing. *Econometrica*, 55(2): 251-76.

Rogoff, Kenneth. 1995. What Remains of Purchasing Power Parity? *Working* Papers 95-07, C.V. Starr Center for Applied Economics, New York University.

Sims, Christopher A. 1972. Money, Income, and Causality. *American Economic Review*, American Economic Association, vol. 62(4), pages 540-52, September.

Taylor, John. 2000. Low inflation, Pass-Through, and the Pricing Power of Firms. *European Economic Review*, Vo. 44, pp. 1389-1408.

Taylor, Mark P. 1988. An Empirical Examination of Long-run Purchasing Power Parity Using Cointegration Techniques. *Applied Econometrics*; 20; 1369-1382.

Taylor, Mark P. 1995. Exchange Rate Modelling and Macro Fundamentals: Failed Partnership or Open Marriage? *British Review of Economic Issues*, 17(42), 1-41.

Vigfusson, Robert J., Nathan Sheets, and Joseph Gagnon. 2007. Exchange rate Pass-Through to Export Prices: Assessing Some Cross-Country Evidence. International Finance Discussion Papers 902.

APPENDIX A

Table A1. Descriptive Statistics of Total CPI and its disaggregated indices.

Variable	Obs	Mean	Std. Dev.	Min	Max
Total CPI	132	193.933	59.611	105.884	293.242
Foodstuff products-total	132	198.329	57.390	108.368	293.538
Bread and bakery products	132	193.227	51.823	103.023	274.307
Meat and meat products	132	310.876	118.888	113.636	506.512
Fish and fish products	132	241.556	73.448	112.360	350.347
Milk and dairy products	132	189.974	60.559	109.412	293.425
Eggs	132	125.946	49.251	54.940	240.931
Sugar	132	198.396	64.837	103.226	351.007
Vegetable oil	132	203.085	81.720	105.268	418.813
Margarine. fats	132	143.493	36.474	96.152	210.376
Vegetables	132	148.276	61.226	42.183	284.954
Potatoes	132	35.924	26.861	3.893	123.185
Grapes	132	23847.130	28307.760	104.019	105072.200
Fresh fruits	132	483.120	344.192	86.614	1367.910
Citrus fruits	132	142.980	28.513	95.861	231.410
Nuts	132	146.877	49.469	84.849	257.969
Fruit juice	132	164.508	38.698	103.632	231.036
Alcoholic drinks	132	210.913	70.887	103.023	326.006
Non-alcoholic beverages	132	149.143	34.839	102.010	208.159
Other food	132	150.938	41.309	101.204	240.994
Non-foodstuff products-total	132	187.253	57.770	103.023	280.658
Clothing	132	203.854	60.022	104.448	287.937
Knitwear	132	219.376	72.238	106.090	322.795
Fancy goods	132	167.054	50.978	101.606	261.308
Footwear	132	196.875	55.679	102.617	268.576
Furniture	132	146.538	31.457	103.023	195.622
Carpets	132	156.836	36.685	106.709	223.827
Freezers and refrigerators	132	134.246	17.287	101.003	157.983
Washing machines	132	139.737	15.444	100.400	158.567

Table A1. (cont.) Descriptive Statistics of Total CPI and its disaggregated indices.

Variable	Obs	Mean	Std. Dev.	Min	Max
Sport goods	132	155.143	40.837	101.204	225.467
Cars	132	153.666	41.998	100.601	226.985
Printed publication	132	158.822	37.302	103.429	218.385
Cosmetics	132	168.525	44.733	103.023	241.212
Medicaments	132	222.565	97.285	103.226	418.827
Construction materials	132	179.436	53.169	101.003	253.649
Fuel	132	193.898	78.575	101.003	336.219
Services – total	132	180.758	62.557	101.808	296.546
Cultural services	132	135.645	27.099	100.000	198.921
Communal services	132	193.941	82.873	101.204	369.297
Passenger transport services	132	164.621	53.573	104.858	258.093
Communication services	132	135.645	27.099	100.000	198.921
Public alimentation	132	139.869	26.294	100.000	161.773

Table A2. Descriptive Statistics of PPI and its disaggregated indices.

Variable	Obs	Mean	Std. Dev.	Min	Max
Total PPI	132	177.423	43.886	103.800	248.090
Mining and quarrying	132	242.576	110.425	92.942	419.418
Manufacturing industry	132	181.152	44.181	104.500	245.651
Manufacture of food products and beverages	132	184.656	44.082	104.160	253.397
Production. processing and preserving of meat and meat products	132	276.951	93.314	100.000	428.220
Processing and preserving of fruits and vegetables	132	167.508	42.901	100.994	274.521
Manufacture of dairy products	132	168.311	47.002	103.700	260.470
Manufacture of products of flour-milling industry	132	145.835	33.346	100.000	242.846
Manufacture of bread and pastry products	132	145.792	15.231	101.100	170.233
Manufacture of sugar	132	180.968	56.333	108.082	322.673
Manufacture of cocoa, chocolate and sugar confectionery	132	121.196	23.362	86.950	168.870
Manufacture of macaroni, noodles and similar farinaceous products	132	156.371	44.168	100.000	249.443
Manufacture of wine	132	182.376	40.714	105.728	241.244
Production of mineral water and freshener beverages	132	122.526	18.200	99.272	165.865
Manufacture of tobacco products	132	155.152	34.676	100.600	243.674
Manufacture of textiles	132	172.085	56.474	85.311	262.998
Manufacture of wearing apparel; dressing and dyeing of furs	132	184.026	61.451	85.260	265.075
Manufacture of leather, leather products and manufacture of footwear	132	180.855	36.642	101.985	245.320

Table A2. (cont.) Descriptive Statistics of PPI and its disaggregated indices.

Variable	Obs	Mean	Std. Dev.	Min	Max
Manufacture of wood and wood products	132	165.634	47.949	96.483	261.469
Manufacture of paper and paperboard	132	140.790	20.873	102.640	175.753
Chemical industry	132	138.088	19.902	99.100	172.329
Manufacture of rubber and plastic products	132	138.992	37.337	86.786	191.519
Manufacture of other non-metallic mineral products	132	195.120	56.925	96.100	286.546
Manufacture of machinery and equipment	132	181.358	46.207	109.000	266.395
Manufacture of electrical machinery and apparatus	132	157.320	23.891	127.488	211.658
Manufacture of medical precision and optical instruments	132	126.851	30.832	84.764	185.072
Manufacture of furniture and other industrial activities	132	152.923	42.725	99.140	226.855
Manufacture of furniture	132	149.892	38.935	99.140	216.962
Electricity and heat gas and water supply	132	221.352	130.019	100.000	487.823
Production and distribution of electricity	132	214.543	118.969	100.000	461.074
Steam and hot water supply	132	222.775	146.017	100.000	531.402

Table A3. Descriptive Statistics of explanatory variables.

Variable	Obs	Mean	Std. Dev.	Min	Max
World Oil price	132	54.151	26.240	19.440	140
NEER	132	104.000	9.097	90.631	129.181
GDP interpolated	132	10020.55	4875.558	2420	20601
Interest rate	132	1.289	0.400	0.54	2.39

APPENDIX B

Table B1. Augmented Dickey-Fuller (ADF) Test results for CPI.

Variable	ADF (Schwarz-info criterion)	Number of lags differenced	ADF (Schwarz-info criterion) (SA Data)	Number of lags differenced (SA Data)
CPI Aggregated	-3.069 **	2	-2.907**	1
Foodstuff products-total	-2.862 *	2	-2.932 **	1
Bread and bakery products	-2.603 *	1	-2.645 *	1
Meat and meat products	-2.506	1	-2.435	1
Fish and fish products	-3.108 **	1	-4.611 ***	0
Milk and dairy products	-2.017	4	-1.701	2
Eggs	-2.996 **	1	-1.989	2
Sugar	-2.825 *	1	-2.852*	1
Vegetable oil	-1.334	1	-1.196	1
Margarine. fats	-1.334	1	-1.619	1
Vegetables	-2.637 *	2	-1.673	1
Potatoes	-0.607	2	-0.066	1
Grapes	-1.860	2	-2.468	1
Fresh fruits	-1.997	3	-2.333	1
Citrus fruits	-2.970 **	1	-2.017	3
Nuts	-1.370	1	-1.403	1
Fruit juice	-3.890 ***	1	-3.794***	1
Alcoholic drinks	-3.096 **	1	-3.344**	1
Non-alcoholic beverages	-2.839 *	1	-2.897**	1
Other food	-0.990	1	-1.030	1
Non-foodstuff products-total	-2.364	1	-2.549	1
Clothing	-4.019 ***	1	-4.752***	1
Knitwear	-3.768 ***	1	-5.055***	1

Table B1. (cont.) Augmented Dickey-Fuller Test results for CPI.

Variable	ADF[1.] (Schwarz-info criterion)	Number of lags differen-ced[2.]	ADF[1.] (Schwarz-info criterion) (SA Data)	Number of lags differen-ced[2.] (SA Data)
Footwear	-4.612 ***	1	-3.207**	3
Furniture	-1.800	2	-0.889	5
Carpets	-0.902	1	-1.736	0
Freezers and refrigerators	-1.901	6	-7.283***	0
Washing machines	-5.937 ***	1	-6.347***	1
TV sets	-4.472 ***	1	-4.758***	1
Cars	-1.814	1	-1.907	1
Printed publications	-0.776	1	-0.737	1
Cosmetics and perfumery	-2.749 *	1	-2.870*	1
Medicaments	-1.255	1	-1.215	1
Construction materials	-2.633 *	1	-2.792*	1
Fuel	-0.970	1	-1.107	1
Services – total	-1.625	1	-1.930	0
Cultural services	0.916	2	1.446	0
Communal services	-0.911	0	-0.944	0
Passenger transport services	-0.053	0	-0.094	0
Communication services	-2.079	0	-2.076	0
Public alimentation	-1.488	1	-1.557	1

* significant at 10%; ** significant at 5%; *** significant at 1%

Note:

1.) Absolute value of t-statistics is presented. The null hypothesis is that the time series are nonstationary. Asterisks denote rejection of null hypothesis.

2.) Number of lags differenced is chosen based on p-value of the alternative Durbin-Watson test for autocorrelation with H0: no autocorrelation. The results of Durbin-Watson are not presented due to space saving.

3.) The last two columns present results for seasonally adjusted (SA) data.

Table B2. Augmented Dickey-Fuller Test results for PPI.

Variable	ADF (Schwarz-info criterion)	Number of lags differenced	ADF-SA (Schwarz-info criterion)	Number of lags differenced (SA Data)
PPI Total	-2.379	0	-2.380	0
Mining and quarrying	-0.861	0	-0.892**	0
Manufacturing industry	-2.891 **	0	-2.904	0
Manufacture of food products and beverages	-2.589 *		-2.533	0
Manufacture of tobacco products	-0.078	0	0.174	0
Manufacture of textiles	-0.578	3	-0.404	2
Manufacture of wearing apparel; dressing and dyeing of furs	-1.690	1	-1.830	1
Manufacture of leather. leather products and manufacture of footwear	-1.351	1	-2.315	1
Manufacture of footwear	-1.073	1	-1.176	1
Manufacture of wood and wood products	-1.153	1	-1.018	1
Manufacture of paper and paperboard	-0.474	1	-0.316	1
Chemical industry	-1.985	1	-2.074	1
Manufacture of rubber and plastic products	-0.311	0	-0.232	0
Manufacture of other non-metallic mineral products	-2.200	0	-2.007	1
Manufacture of machinery and equipment	-1.320	0	-1.290	1
Manufacture of electrical machinery and apparatus	-1.413	0	-1.376	2
Manufacture of medical. precision and optical instruments	-1.192	1	-1.131	1
Manufacture of furniture and other industrial activities	0.141	1	0.166	1
Electricity and heat. gas and water supply	-0.086	1	-0.134	2

Table B3. Augmented Dickey-Fuller Test for explanatory variables.

Variable	ADF (Schwarz-info criterion)	Number of lags differenced
NEER	-2.228	1
Money Supply (M2,Seasonal adjusted)	-2.046	0
Oil prices	-1.055	0
Output gap	-1.236	1
Interest rate	-1.274	1

* significant at 10%; ** significant at 5%; *** significant at 1%

APPENDIX C

Table C1. Cointegration results for CPI by category.

Variable	ADF t-statistics	p-value	Number of lags differenced
Total (CPI)	-1.0881	0.7504	1
Foodstuff products-total	-1.5881	0.4896	1
Bread and bakery products	-1.9494	0.3092	1
Meat and meat products	-1.7132	0.4243	1
Fish and fish products	-0.8777	0.7952	1
Milk and dairy products	-1.5734	0.4969	0
Eggs	-1.4754	0.5456	1
Sugar	-1.0405	0.7382	1
Vegetable oil	-0.3385	0.9199	1
Margarine. fats	-1.7819	0.3895	1
Vegetables	-0.5378	0.8844	1
Potatoes	-1.7589	0.4010	1
Grapes	-1.1501	0.6947	1
Fresh fruits	-1.0422	0.7376	1
Citrus fruits	-0.0007	0.9585	1
Nuts	-0.9400	0.7745	1
Fruit juice	-1.2451	0.6539	1
Alcoholic drinks	-1.2207	0.6646	1
Non-alcoholic beverages	0.1398	0.9687	1
Other food	-0.9942	0.7554	1
Non-foodstuff products-total	-1.5571	0.5051	1
Clothing	-1.4569	0.5547	1
Knitwear	-0.3558	0.9172	1
Fancy goods	-1.7124	0.4247	1
Footwear	-0.6910	0.8491	1
Furniture	-0.3240	0.9220	1
Carpets	-1.7262	0.4177	1
Freezers and refrigerators	-3.0032**	0.0346	1
Washing machines	-2.3180	0.1662	1
TV sets	-1.0422	0.7376	1
Sports goods	-0.1976	0.9388	1
Cars	-0.9166	0.7824	1
Printed publications	-0.8746	0.7962	1
Cosmetics and perfumery	-0.4239	0.9060	1
Medicaments	-1.2086	0.6699	1
Construction materials	-0.4832	0.8953	1

Table C1. (cont.) Cointegration results for CPI by category

Variable	ADF t-statistics	p-value[3.)]	Number of lags differenced[2.)]
Fuel	-0.4436	0.9026	1
Services – total	0.1043	0.9664	1
Cultural services	0.1754	0.9708	1
Communal services	-0.2559	0.9315	1
Passenger transport services	-1.8256	0.3678	1
Communication services	-0.8707	0.7975	1
Public alimentation	-0.8707	0.7975	1

* significant at 10%; ** significant at 5%; *** significant at 1%

Note:

3.) p-value of the alternative Durbin-Watson test for autocorrelation with H0: no autocorrelation.

Table C2. Cointegration results for PPI by category.

Variable	ADF t-statistics	p-value	Number of lags differenced
Total(PPI)	-1.4125	0.5763	1
Mining and quarrying	-1.0990	0.7155	1
Manufacturing industry	-1.6148	0.4755	1
Manufacture of food products and beverages	-1.8384	0.3616	1
Production. processing and preserving of meat and meat products	-1.7132	0.4243	1
Processing and preserving of fruits and vegetables	-1.4008	0.5819	1
Manufacture of dairy products	-0.9813	0.7600	1
Manufacture of products of flour-milling industry	-1.1850	0.6800	1
Manufacture of bread and pastry products	-3.4700**	0.0088	1
Manufacture of sugar	-1.0707	0.7266	0
Manufacture of cocoa. chocolate and sugar confectionery	-0.2273	0.9352	0
Manufacture of macaroni. noodles and similar farinaceous products	-0.2511	0.9322	0
Manufacture of wine	-2.3627	0.1526	1
Production of mineral water and freshener beverages	-1.6151	0.4753	1
Manufacture of tobacco products	0.1340	0.9683	0
Manufacture of textiles	-1.1396	0.6990	0
Manufacture of wearing apparel; dressing and dyeing of furs	-1.3032	0.6277	0
Manufacture of leather. leather products and manufacture of footwear	-2.2883	0.1758	1
Manufacture of footwear	0.1890	0.9716	2
Manufacture of wood and wood products	-1.3579	0.6023	0
Manufacture of paper and paperboard	-0.5302	0.8860	1
Chemical industry	-1.9712	0.2994	1
Manufacture of rubber and plastic products	-0.3808	0.9133	0

Table C2. (cont.) Cointegration results for PPI by category

Variable	ADF t-statistics	p-value	Number of lags differenced
Manufacture of other non-metallic mineral products	-1.8677	0.3474	0
Manufacture of machinery and equipment	-1.2671	0.6441	0
Manufacture of electrical machinery and apparatus	-1.7152	0.4233	0
Manufacture of medical. precision and optical instruments	-1.1130	0.7099	1
Manufacture of furniture and other industrial activities	-0.3445	0.9190	1
Manufacture of furniture	-0.4633	0.8990	1
Electricity and heat. gas and water supply	-0.1454	0.9447	2
Production and distribution of electricity	0.3146	0.9780	0
Steam and hot water supply	0.4738	0.9841	0

APPENDIX D

Table D1. VAR estimations for CPI.

Variable	Total CPI		Foodstuff products-total		Bread and bakery products		Meat and meat products		Fish and fish products	
NEER (T)	-0.099*	(0.071)	-0.034	(0.681)	0.051	(0.475)	-0.123*	(0.086)	-0.052	(0.186)
NEER(T-1)							0.200**	(0.011)		
NEER(T-2)							-0.047	(0.498)		
NEER(T-4)										
Oil_prices(T)	0.018*	(0.093)	0.020	(0.214)	0.012	(0.355)	0.010	(0.439)	-0.002	(0.825)
Oil_prices(T-1)	0.022**	(0.033)	0.024	(0.138)	-0.015	(0.264)	-0.014	(0.268)	0.018**	(0.018)
Oil_prices(T-2)	-0.022**	(0.040)	-0.024	(0.155)	0.012	(0.383)	0.015	(0.252)	-0.001	(0.870)
M2(T)	0.055*	(0.095)	0.064	(0.199)	-0.021	(0.607)	0.076*	(0.052)	-0.018	(0.455)
M2(T-1)	0.023	(0.484)	-0.019	(0.701)	0.087**	(0.033)	0.004	(0.920)	0.062***	(0.007)
M2(T-2)	0.087***	(0.007)	0.085*	(0.082)	0.047	(0.246)	0.065*	(0.091)	0.037	(0.117)
Outputgap(T)	0.022	(0.698)	0.102	(0.245)	0.011	(0.877)	-0.079	(0.246)	-0.017	(0.687)
Output gap(T-1)	-0.015	(0.873)	-0.135	(0.354)	0.003	(0.980)	0.119	(0.289)	0.032	(0.636)
Output gap(T-2)	0.008	(0.892)	0.059	(0.501)	-0.003	(0.962)	-0.061	(0.363)	-0.019	(0.637)
Interest rate(T)	-0.012	(0.328)	0.002	(0.928)	0.016	(0.310)	-0.035**	(0.024)	0.009	(0.333)
Interest rate(T-1)	0.048***	(0.000)	0.117***	(0.000)	0.003	(0.857)	-0.009	(0.560)	0.014	(0.126)
Interest rate(T-2)	0.015	(0.231)	-0.032	(0.111)	-0.001	(0.941)	-0.019	(0.206)	0.012	(0.155)
const.	0.002	(0.269)	0.002	(0.447)	0.002	(0.336)	0.003*	(0.082)	0.003***	(0.004)
R-sqr.	0.3968	(0.000)	0.4544	(0.000)	0.4888	(0.000)	0.1739	(0.080)	0.3264	(0.000)
N of obs.	129		129		129		128		129	

* significant at 10%; ** significant at 5%; *** significant at 1%

Notes: Preferred VAR-lags specification is chosen based on Akaike Information Criteria, Hannan Quinn, Schwarz Criterion, Likelihood ratio test.

Table D1.(cont.) VAR estimations for CPI.

Variable	Milk and dairy products		Eggs		Sugar		Vegetable oil		Margarine, fats	
NEER (T)	-0.629	(0.109)	-0.165	(0.127)	-0.085	(0.399)	-0.016	(0.663)	-0.915***	(0.002)
NEER(T-1)	-0.806**	(0.040)								
NEER(T-2)										
NEER(T-4)										
Oil_prices(T)	0.098	(0.147)	0.043**	(0.036)	0.054***	(0.006)	0.009	(0.232)	0.048	(0.398)
Oil_prices(T-1)	0.036	(0.590)	0.005	(0.807)	0.033*	(0.100)	0.001	(0.875)	0.085	(0.137)
Oil_prices(T-2)	-0.064	(0.354)	-0.011	(0.586)	-0.023	(0.249)	0.004	(0.602)	-0.151**	(0.010)
M2(T)	-0.209	(0.323)	0.164**	(0.011)	0.093	(0.127)	0.024	(0.277)	0.316*	(0.079)
M2(T-1)	0.393*	(0.060)	-0.034	(0.599)	0.098	(0.108)	0.011	(0.625)	-0.150	(0.398)
M2(T-2)	-0.084	(0.689)	0.093	(0.141)	0.145**	(0.019)	0.021	(0.341)	0.300*	(0.086)
Outputgap(T)	0.315	(0.398)	-0.087	(0.444)	-0.080	(0.449)	0.001	(0.977)	0.475	(0.132)
Output gap(T-1)	-0.320	(0.603)	0.177	(0.344)	0.113	(0.518)	0.001	(0.989)	-0.842	(0.106)
Output gap(T-2)	0.134	(0.715)	-0.118	(0.291)	-0.043	(0.684)	0.002	(0.957)	0.519*	(0.096)
Interest rate(T)	0.114	(0.168)	-0.012	(0.636)	-0.039*	(0.098)	0.003	(0.696)	-0.013	(0.852)
Interest rate(T-1)	0.218**	(0.010)	0.062**	(0.017)	-0.017	(0.482)	0.018**	(0.045)	0.042	(0.559)
Interest rate(T-2)	0.271***	(0.001)	-0.074***	(0.002)	0.024	(0.286)	0.006	(0.504)	0.055	(0.395)
const.	0.011	(0.241)	-0.002	(0.591)	-0.004	(0.181)	0.003**	(0.005)	-0.005	(0.537)
R-sqr.	0.2623	(0.000)	0.4558	(0.000)	0.5868	(0.000)	0.1878	(0.008)	0.2749	(0.000)
N of obs.	129		129		129		129		129	

Table D1. (cont.) VAR estimations for CPI.

Variable	Vegetables		Potatoes		Grapes		Fresh fruits		Citrus fruits	
NEER (T)	-0.973**	(0.024)	-0.810*	(0.086)	-0.420**	(0.019)	-0.217**	(0.041)	-0.311**	(0.018)
NEER(T-1)										
NEER(T-2)										
NEER(T-4)										
Oil_prices(T)	-0.057	(0.486)	0.069	(0.438)	0.028	(0.405)	0.005	(0.798)	0.002	(0.949)
Oil_prices(T-1)	0.105	(0.206)	0.013	(0.880)	-0.052	(0.121)	0.021	(0.306)	0.055**	(0.025)
Oil_prices(T-2)	-0.118	(0.166)	-0.005	(0.958)	-0.017	(0.623)	0.013	(0.515)	0.018	(0.478)
M2(T)	0.161	(0.533)	0.623**	(0.026)	0.324***	(0.002)	0.096	(0.127)	-0.023	(0.766)
M2(T-1)	-0.195	(0.442)	0.439	(0.116)	0.063	(0.555)	-0.032	(0.613)	0.010	(0.898)
M2(T-2)	0.195	(0.439)	0.498*	(0.075)	0.065	(0.539)	0.018	(0.764)	0.081	(0.284)
Outputgap(T)	-0.088	(0.847)	-0.264	(0.593)	0.093	(0.616)	0.024	(0.825)	0.072	(0.598)
Output gap(T-1)	0.155	(0.838)	0.560	(0.491)	-0.156	(0.613)	-0.046	(0.803)	-0.155	(0.495)
Output gap(T-2)	-0.068	(0.880)	-0.335	(0.491)	0.102	(0.581)	0.037	(0.737)	0.096	(0.478)
Interest rate(T)	-0.089	(0.376)	-0.042	(0.702)	-0.091**	(0.027)	0.002	(0.940)	0.014	(0.646)
Interest rate(T-1)	0.232**	(0.024)	0.107	(0.333)	-0.010	(0.820)	-0.021	(0.400)	-0.010	(0.739)
Interest rate(T-2)	0.178*	(0.060)	0.047	(0.646)	0.050	(0.202)	-0.057**	(0.013)	0.008	(0.777)
const.	-0.018	(0.135)	0.010	(0.417)	0.000	(0.949)	0.001	(0.821)	0.004	(0.282)
R-sqr.	0.1530	(0.055)	0.1760	(0.016)	0.3386	(0.000)	0.2313	(0.000)	0.2232	(0.001)
N of obs.	129		129		129		129		129	

Table D1. (cont.) VAR estimations for CPI.

Variable	Nuts		Fruit juice		Alcoholic drinks		Non-alcoholic beverages		Other food	
NEER (T)	0.055**	(0.042)	0.028	(0.264)	0.020	(0.34)	0.014	(0.611)	-0.067***	(0.000)
NEER(T-1)							-0.019	(0.455)	0.038**	(0.038)
NEER(T-2)										
NEER(T-4)										
Oil_prices(T)	0.004	(0.465)	-0.005	(0.246)	0.010	(0.91)	-0.005	(0.319)	0.010***	(0.001)
Oil_prices(T-1)	0.003	(0.566)	0.006	(0.223)	0.007	(0.61)	0.008*	(0.090)	0.006*	(0.074)
Oil_prices(T-2)	-0.004	(0.427)	-0.002	(0.622)	0.002	(0.20)	0.002	(0.651)	0.004	(0.188)
M2(T)	0.015	(0.339)	0.007	(0.642)	0.013	(0.37)	0.022	(0.131)	-0.001	(0.904)
M2(T-1)	0.006	(0.677)	0.014	(0.338)	-0.013	(-0.38)	0.009	(0.525)	0.013	(0.179)
M2(T-2)	0.039**	(0.013)	-0.002	(0.878)	-0.004	(-0.11)	0.005	(0.719)	0.017*	(0.089)
Outputgap(T)	0.018	(0.529)	0.005	(0.842)	0.001	(0.01)	-0.009	(0.714)	-0.001	(0.951)
Output gap(T-1)	-0.023	(0.621)	-0.001	(0.980)	-0.012	(-0.12)	0.015	(0.723)	-0.004	(0.877)
Output gap(T-2)	0.009	(0.737)	-0.003	(0.921)	0.014	(0.24)	-0.008	(0.759)	0.005	(0.755)
Interest rate(T)	0.001	(0.822)	-0.008	(0.175)	0.017	(1.27)	0.006	(0.291)	-0.004	(0.313)
Interest rate(T-1)	0.002	(0.721)	0.001	(0.876)	0.006	(0.39)	-0.007	(0.205)	0.002	(0.677)
Interest rate(T-2)	-0.012**	(0.042)	0.003	(0.606)	0.027*	(2.15)	0.001	(0.859)	0.006	(0.124)
const.	0.003***	(0.000)	0.004***	(0.000)	0.003	(1.68)	0.001	(0.126)	0.002***	(0.003)
R-sqr.	0.2135	(0.001)	0.3559	(0.000)	0.2526	(0.000)	0.3577	(0.000)	0.5637	(0.000)
N of obs.	129		129		129		129		129	

Table D1. (cont.) VAR estimations for CPI.

Variable	Non-foodstuff products-total		Clothing		Knitwear		Fancy goods		Footwear	
NEER (T)	-0.021	(0.224)	-0.017	(0.329)	0.023	(0.489)	-0.075***	(0.002)	0.010	(0.565)
NEER(T-1)	-0.001	(0.972)	0.005	(0.793)	-0.001	(0.967)	0.042	(0.104)		
NEER(T-2)	-0.002	(0.883)	0.012	(0.514)			-0.001	(0.967)		
NEER(T-4)			-0.040**	(0.020)						
Oil_prices(T)	-0.001	(0.717)	0.006*	(0.073)	0.007	(0.243)	0.003	(0.426)	0.001	(0.867)
Oil_prices(T-1)	0.002	(0.563)	-0.000	(0.878)	0.007	(0.210)	-0.005	(0.233)	0.004	(0.194)
Oil_prices(T-2)	-0.000	(0.915)	-0.002	(0.595)	0.003	(0.666)	-0.001	(0.806)	0.003	(0.362)
M2(T)	0.012	(0.190)	-0.007	(0.460)	0.006	(0.723)	0.020	(0.133)	-0.012	(0.250)
M2(T-1)	0.007	(0.485)	-0.005	(0.584)	0.028	(0.118)	-0.040***	(0.002)	-0.002	(0.859)
M2(T-2)	0.005	(0.594)	0.027***	(0.006)	0.026	(0.154)	0.027**	(0.044)	0.017*	(0.099)
Outputgap(T)	0.005	(0.760)	0.025	(0.148)	-0.022	(0.501)	0.020	(0.374)	0.022	(0.249)
Output gap(T-1)	-0.005	(0.841)	-0.044	(0.124)	0.038	(0.470)	-0.026	(0.484)	-0.040	(0.207)
Output gap(T-2)	0.002	(0.882)	0.026	(0.119)	-0.021	(0.509)	0.011	(0.636)	0.024	(0.210)
Interest rate(T)	-0.003	(0.379)	-0.001	(0.864)	0.001	(0.905)	0.000	(0.932)	0.009**	(0.031)
Interest rate(T-1)	-0.003	(0.382)	0.002	(0.599)	0.006	(0.429)	0.010*	(0.052)	0.009*	(0.051)
Interest rate(T-2)	0.001	(0.809)	0.003	(0.414)	0.011*	(0.091)	0.001	(0.857)	0.006	(0.127)
const.	0.001	(0.235)	0.001	(0.218)	0.005***	(0.000)	0.002**	(0.045)	0.004***	(0.000)
R-sqr.	0.5712	(0.000)	0.5730	(0.000)	0.1209	(0.339)	0.4736	(0.000)	0.1612	(0.037)
N of obs.	128		127		129		128		129	

Table D1. (cont.) VAR estimations for CPI.

Variable	Furniture		Carpets		Freezers and refrigerators		Washing machines		TV sets	
NEER (T)	-0.005	(0.837)	-0.046*	(0.050)	-0.026	(0.293)	-0.029	(0.137)	0.018	(0.486)
NEER(T-1)					0.006	(0.822)	0.020	(0.283)		
NEER(T-2)					0.018	(0.451)				
NEER(T-4)										
Oil_prices(T)	0.002	(0.665)	-0.002	(0.666)	-0.006	(0.199)	-0.004	(0.232)	0.000	(0.982)
Oil_prices(T-1)	-0.001	(0.886)	-0.000	(0.943)	-0.000	(0.955)	-0.002	(0.494)	0.010**	(0.037)
Oil_prices(T-2)	-0.004	(0.322)	0.001	(0.761)	0.004	(0.365)	-0.001	(0.857)	0.011**	(0.038)
M2(T)	-0.003	(0.831)	-0.003	(0.814)	0.011	(0.420)	0.020*	(0.055)	0.000	(0.986)
M2(T-1)	0.007	(0.604)	0.001	(0.926)	0.026**	(0.044)	0.002	(0.825)	0.020	(0.186)
M2(T-2)	0.012	(0.374)	0.005	(0.705)	-0.008	(0.554)	0.001	(0.890)	-0.008	(0.598)
Outputgap(T)	-0.012	(0.611)	0.017	(0.477)	-0.014	(0.550)	-0.017	(0.360)	-0.057**	(0.036)
Output gap(T-1)	0.026	(0.504)	-0.022	(0.582)	0.026	(0.491)	0.028	(0.348)	0.093**	(0.041)
Output gap(T-2)	-0.017	(0.464)	0.009	(0.710)	-0.015	(0.512)	-0.015	(0.411)	-0.050*	(0.062)
Interest rate(T)	0.002	(0.667)	-0.002	(0.658)	-0.012**	(0.025)	-0.007*	(0.072)	0.009	(0.128)
Interest rate(T-1)	0.008	(0.115)	-0.001	(0.886)	0.000	(0.985)	0.002	(0.678)	0.008	(0.181)
Interest rate(T-2)	0.010*	(0.051)	0.003	(0.613)	-0.011**	(0.045)	-0.002	(0.570)	0.007	(0.250)
const.	0.006***	(0.000)	0.002***	(0.000)	0.000	(0.483)	0.000	(0.460)	0.005***	(0.000)
R-sqr.	0.0619	(0.861)	0.1399	(0.102)	0.3589	(0.000)	0.2481	(0.000)	0.1670	(0.027)
N of obs.	129		129		128		129		129	

Table D1. (cont.) VAR estimations for CPI.

Variable	Sports goods		Cars		Printed publications		Cosmetics and perfumery		Medicaments	
NEER (T)	0.012	(0.737)	0.101**	(0.030)	0.056*	(0.097)	-0.007	(0.865)	-0.048*	(0.077)
NEER(T-1)			-0.060	(0.203)	-0.092**	(0.012)	-0.089**	(0.025)	0.064**	(0.028)
NEER(T-2)					0.006	(0.857)			-0.038	(0.155)
NEER(T-4)										
Oil_prices(T)	0.007	(0.314)	-0.014*	(0.085)	0.002	(0.704)	0.021***	(0.003)	-0.003	(0.563)
Oil_prices(T-1)	0.012*	(0.078)	0.010	(0.229)	0.012**	(0.042)	0.006	(0.396)	0.004	(0.445)
Oil_prices(T-2)	0.011	(0.122)	0.004	(0.594)	0.003	(0.569)	-0.006	(0.428)	0.003	(0.511)
M2(T)	-0.007	(0.764)	-0.021	(0.411)	-0.008	(0.666)	-0.021	(0.333)	0.020	(0.173)
M2(T-1)	0.003	(0.876)	0.004	(0.888)	0.009	(0.619)	-0.000	(0.993)	0.030**	(0.037)
M2(T-2)	0.030	(0.152)	0.003	(0.896)	0.015	(0.412)	0.002	(0.932)	0.017	(0.260)
Outputgap(T)	-0.003	(0.945)	-0.005	(0.909)	0.015	(0.641)	0.114***	(0.003)	-0.055**	(0.037)
Output gap(T-1)	0.001	(0.981)	0.010	(0.888)	-0.024	(0.649)	-0.200***	(0.002)	0.102**	(0.019)
Output gap(T-2)	0.001	(0.976)	-0.006	(0.900)	0.012	(0.698)	0.121***	(0.001)	-0.062**	(0.018)
Interest rate(T)	0.008	(0.334)	0.004	(0.693)	0.009	(0.226)	-0.006	(0.506)	-0.003	(0.626)
Interest rate(T-1)	0.018**	(0.036)	-0.006	(0.579)	0.003	(0.706)	-0.003	(0.699)	0.000	(0.970)
Interest rate(T-2)	0.014*	(0.081)	-0.003	(0.751)	0.000	(0.999)	0.004	(0.639)	-0.004	(0.449)
const.	0.004***	(0.000)	0.007***	(0.000)	0.004***	(0.000)	0.004***	(0.001)	0.000	(0.574)
R-sqr.	0.1915	(0.006)	0.1127	(0.426)	0.1504	(0.204)	0.4143	(0.000)	0.4591	(0.000)
N of obs.	129		129		128		129		128	

Table D1. (cont.) VAR estimations for CPI.

Variable	Construction materials		Fuel		Services – total		Cultural services		Communal services	
NEER (T)	-0.245***	(0.009)	-0.038	(-0.81)	0.047	(0.284)	-0.093	(0.261)	-0.009	(0.921)
NEER(T-1)	0.243***	(0.010)			-0.102**	(0.019)				
NEER(T-2)										
NEER(T-4)										
Oil_prices(T)	0.043***	(0.008)	-0.007	(0.418)	0.003	(0.726)	-0.026*	(0.097)	0.002	(0.926)
Oil_prices(T-1)	0.046***	(0.004)	-0.016*	(0.075)	-0.000	(0.975)	-0.043***	(0.006)	0.007	(0.680)
Oil_prices(T-2)	0.051***	(0.003)	0.022**	(0.015)	0.003	(0.695)	0.031*	(0.062)	0.003	(0.867)
M2(T)	-0.012	(0.814)	0.005	(0.849)	-0.037	(0.121)	-0.019	(0.696)	0.055	(0.308)
M2(T-1)	0.060	(0.224)	0.006	(0.819)	0.066***	(0.005)	0.014	(0.768)	0.018	(0.740)
M2(T-2)	0.043	(0.394)	0.017	(0.533)	-0.010	(0.678)	0.020	(0.672)	0.037	(0.490)
Outputgap(T)	-0.102	(0.250)	-0.046	(0.353)	-0.023	(0.583)	-0.115	(0.189)	0.023	(0.813)
Output gap(T-1)	0.124	(0.395)	0.091	(0.268)	0.035	(0.613)	0.224	(0.121)	-0.008	(0.962)
Output gap(T-2)	-0.059	(0.501)	-0.065	(0.191)	-0.014	(0.730)	-0.156*	(0.071)	-0.005	(0.957)
Interest rate(T)	-0.018	(0.362)	0.008	(0.481)	-0.006	(0.540)	0.011	(0.560)	-0.012	(0.570)
Interest rate(T-1)	0.014	(0.468)	0.020*	(0.071)	0.001	(0.956)	0.037*	(0.061)	-0.003	(0.873)
Interest rate(T-2)	0.019	(0.313)	0.005	(0.607)	0.006	(0.472)	0.011	(0.560)	0.003	(0.875)
const.	0.002	(0.281)	0.007***	(0.000)	0.003**	(0.019)	0.010***	(0.000)	0.004	(0.130)
R-sqr.	0.4066	(0.000)	0.1213	(0.216)	0.1997	(0.010)	0.1556	(0.049)	0.0421	(0.974)
N of obs.	129		129		129		129		129	

Table D1. (cont.) VAR estimations for CPI.

Variable	Passenger transport services		Communication services		Public alimentation	
NEER (T)	-0.009	(0.944)	0.022	(0.797)	0.022	(0.797)
NEER(T-1)						
NEER(T-2)						
NEER(T-4)						
Oil_prices(T)	0.014	(0.544)	0.015	(0.360)	0.015	(0.360)
Oil_prices(T-1)	0.018	(0.445)	0.035**	(0.031)	0.035**	(0.031)
Oil_prices(T-2)	0.046*	(0.053)	-0.014	(0.414)	-0.014	(0.414)
M2(T)	-0.014	(0.844)	0.060	(0.239)	0.060	(0.239)
M2(T-1)	-0.030	(0.674)	0.011	(0.830)	0.011	(0.830)
M2(T-2)	-0.087	(0.220)	0.068	(0.172)	0.068	(0.172)
Outputgap(T)	-0.134	(0.298)	-0.016	(0.863)	-0.016	(0.863)
Output gap(T-1)	0.171	(0.420)	0.043	(0.772)	0.043	(0.772)
Output gap(T-2)	-0.090	(0.477)	-0.024	(0.788)	-0.024	(0.788)
Interest rate(T)	0.024	(0.395)	0.010	(0.624)	0.010	(0.624)
Interest rate(T-1)	0.030	(0.298)	0.022	(0.273)	0.022	(0.273)
Interest rate(T-2)	0.030	(0.258)	0.021	(0.269)	0.021	(0.269)
const.	0.007**	(0.035)	0.010***	(0.000)	0.010***	(0.000)
R-sqr.	0.0731	(0.749)	0.1406	(0.099)	0.1406	(0.099)
N of obs.	129		129		129	

Table D2. VAR estimations for PPI.

Variable	PPI Total		Mining and quarrying		Manufacturing industry		Manufacture of Food products and beverages		Manufacture of tobacco products	
NEER (T)	-0.032	(0.526)	0.404***	(0.007)	-0.039	(0.470)	-0.033	(0.644)	0.021	(0.814)
NEER(T-1)	0.058	(0.238)	-0.233	(0.121)	0.065	(0.214)	0.087	(0.220)		
NEER(T-2)										
Oil_prices(T)	0.015*	(0.069)	0.008	(0.743)	0.018**	(0.030)	0.031***	(0.008)	-0.011	(0.539)
Oil_prices(T-1)	0.013	(0.107)	0.063**	(0.014)	0.018**	(0.033)	0.027**	(0.027)	0.005	(0.753)
Oil_prices(T-2)	0.007	(0.421)	0.049*	(0.068)	0.006	(0.487)	-0.000	(0.997)	-0.003	(0.876)
M2(T)	0.027	(0.281)	0.112	(0.162)	0.028	(0.295)	0.054	(0.144)	0.008	(0.880)
M2(T-1)	0.030	(0.221)	0.010	(0.905)	0.028	(0.281)	0.052	(0.158)	-0.008	(0.877)
M2(T-2)	0.018	(0.470)	0.094	(0.235)	0.008	(0.767)	0.036	(0.335)	0.008	(0.875)
Output gap(T)	-0.046	(0.299)	-0.290**	(0.044)	-0.020	(0.674)	-0.036	(0.579)	0.003	(0.973)
Output gap(T-1)	0.077	(0.291)	0.413*	(0.085)	0.039	(0.608)	0.055	(0.604)	0.007	(0.964)
Output gap(T-2)	-0.048	(0.266)	-0.195	(0.171)	-0.024	(0.593)	-0.025	(0.695)	-0.013	(0.888)
Interest rate(T)	-0.012	(0.243)	-0.022	(0.490)	-0.010	(0.356)	-0.024*	(0.095)	-0.015	(0.473)
Interest rate(T-1)	-0.009	(0.390)	0.088***	(0.006)	-0.008	(0.435)	-0.005	(0.718)	-0.020	(0.357)
Interest rate(T-2)	-0.009	(0.329)	0.053*	(0.083)	-0.008	(0.418)	-0.016	(0.242)	-0.008	(0.697)
Const.	0.002*	(0.068)	0.010***	(0.006)	0.003**	(0.044)	0.001	(0.414)	0.006**	(0.016)
R-sqr.	0.2349	(0.001)	0.2698	(0.000)	0.2405	(0.001)	0.2535	(0.000)	0.0168	(0.999)
N of obs.	129		129		129		129		129	

Table D2. (cont.) VAR estimations for PPI.

Variable	Manufacture of textiles		Manufacture of wearing apparel; dressing and dyeing of furs		Manufacture of leather, leather products and manufacture of footwear		Manufacture of footwear	
NEER (T)	-0.454**	(0.041)	-0.271	(0.150)	-0.210	(0.259)	-0.086	(0.508)
NEER(T-1)			-0.344*	(0.059)			0.169	(0.221)
NEER(T-2)							-0.051	(0.684)
Oil_prices(T)	-0.032	(0.450)	-0.080**	(0.013)	-0.023	(0.524)	-0.013	(0.574)
Oil_prices(T-1)	0.112***	(0.008)	0.051	(0.130)	0.045	(0.205)	0.021	(0.346)
Oil_prices(T-2)	0.012	(0.790)	0.009	(0.802)	0.055	(0.133)	0.044*	(0.059)
M2(T)	-0.144	(0.278)	0.016	(0.875)	0.087	(0.437)	0.045	(0.522)
M2(T-1)	0.026	(0.839)	0.056	(0.564)	0.023	(0.835)	0.016	(0.815)
M2(T-2)	-0.197	(0.128)	0.027	(0.785)	0.014	(0.894)	0.075	(0.285)
Output gap(T)	0.074	(0.750)	-0.114	(0.514)	-0.426**	(0.030)	-0.061	(0.624)
Output gap(T-1)	-0.110	(0.775)	0.202	(0.481)	0.656**	(0.043)	0.050	(0.806)
Output gap(T-2)	0.066	(0.774)	-0.127	(0.461)	-0.354*	(0.067)	-0.010	(0.935)
Interest rate(T)	0.028	(0.583)	0.034	(0.401)	-0.032	(0.470)	0.015	(0.610)
Interest rate(T-1)	0.053	(0.315)	-0.086**	(0.032)	-0.018	(0.677)	-0.030	(0.301)
Interest rate(T-2)	-0.032	(0.503)	0.082**	(0.036)	-0.044	(0.283)	-0.029	(0.276)
Const.	0.014**	(0.018)	0.009**	(0.041)	0.003	(0.514)	0.001	(0.672)
R-sqr.	0.1761	(0.016)	0.3005	(0.000)	0.2222	(0.001)	0.2433	(0.002)
N of obs.	129		129		129		128	

Table D2. (cont.) VAR estimations for PPI.

Variable	Manufacture of wood and wood products		Manufacture of paper and paperboard		Chemical industry		Manufacture of rubber and plastic products		Manufacture of other non-metallic mineral products	
NEER (T)	0.494*	(0.092)	0.119	(0.319)	0.136	(0.242)	-0.337***	(0.005)	0.147	(0.278)
NEER(T-1)	-0.729**	(0.023)							-0.110	(0.461)
NEER(T-2)	0.765***	(0.005)							-0.027	(0.837)
Oil_prices(T)	-0.003	(0.945)	-0.026	(0.258)	0.051**	(0.020)	0.003	(0.885)	0.022	(0.347)
Oil_prices(T-1)	0.008	(0.871)	0.023	(0.326)	-0.029	(0.192)	-0.042*	(0.070)	-0.034	(0.145)
Oil_prices(T-2)	-0.019	(0.709)	0.020	(0.388)	0.041*	(0.076)	-0.017	(0.480)	0.045*	(0.060)
M2(T)	0.293*	(0.055)	-0.009	(0.897)	-0.032	(0.645)	-0.092	(0.202)	0.124*	(0.086)
M2(T-1)	-0.260*	(0.084)	0.024	(0.736)	0.086	(0.204)	0.043	(0.539)	-0.107	(0.137)
M2(T-2)	-0.046	(0.764)	-0.007	(0.920)	-0.050	(0.466)	0.037	(0.601)	0.008	(0.916)
Output gap(T)	0.234	(0.375)	-0.041	(0.745)	-0.151	(0.213)	0.098	(0.438)	0.102	(0.425)
Output gap(T-1)	-0.372	(0.393)	0.020	(0.925)	0.225	(0.263)	-0.123	(0.556)	-0.128	(0.544)
Output gap(T-2)	0.167	(0.522)	-0.009	(0.944)	-0.119	(0.319)	0.068	(0.588)	0.062	(0.623)
Interest rate(T)	0.075	(0.219)	-0.010	(0.724)	-0.017	(0.514)	0.042	(0.129)	0.042	(0.149)
Interest rate(T-1)	0.021	(0.729)	-0.022	(0.430)	0.004	(0.874)	0.031	(0.287)	-0.028	(0.349)
Interest rate(T-2)	-0.009	(0.873)	-0.039	(0.137)	-0.013	(0.606)	0.031	(0.237)	0.018	(0.524)
Const.	0.011	(0.139)	0.002	(0.520)	0.003	(0.290)	0.006**	(0.046)	0.008**	(0.020)
R-sqr.	0.2167	(0.008)	0.1113	(0.304)	0.2301	(0.000)	0.1046	(0.373)	0.1955	(0.028)
N of obs.	128		129		129		129		128	

Table D2. (cont.) VAR estimations for PPI.

Variable	Manufacture of machinery and equipment		Manufacture of electrical machinery and apparatus		Manufacture of medical, precision and optical instruments		Manufacture of furniture and other industrial activities		Electricity and heat, gas and water supply	
NEER (T)	0.108	(0.290)	-0.173	(0.229)	0.018	(0.957)	-0.045	(0.513)	-0.210	(0.340)
NEER(T-1)									0.314	(0.150)
NEER(T-2)										
Oil_prices(T)	0.018	(0.367)	0.003	(0.907)	0.025	(0.687)	0.001	(0.951)	-0.005	(0.906)
Oil_prices(T-1)	-0.028	(0.151)	0.020	(0.459)	0.175***	(0.005)	0.006	(0.675)	-0.064*	(0.091)
Oil_prices(T-2)	0.019	(0.339)	0.039	(0.172)	-0.019	(0.770)	-0.013	(0.321)	0.061	(0.117)
M2(T)	0.091	(0.131)	-0.208**	(0.016)	0.221	(0.263)	-0.013	(0.753)	0.021	(0.859)
M2(T-1)	0.021	(0.721)	-0.015	(0.858)	0.000	(0.998)	0.133***	(0.001)	0.089	(0.447)
M2(T-2)	0.124**	(0.036)	0.037	(0.659)	0.060	(0.754)	0.001	(0.980)	0.123	(0.296)
Output gap(T)	0.134	(0.207)	0.292*	(0.056)	-0.748**	(0.032)	-0.018	(0.803)	-0.061	(0.772)
Output gap(T-1)	-0.197	(0.264)	-0.542**	(0.032)	1.220**	(0.034)	0.028	(0.815)	0.094	(0.786)
Output gap(T-2)	0.111	(0.289)	0.337**	(0.026)	-0.681**	(0.047)	-0.012	(0.868)	-0.095	(0.647)
Interest rate(T)	0.020	(0.392)	0.046	(0.165)	-0.072	(0.350)	0.012	(0.471)	-0.049	(0.304)
Interest rate(T-1)	0.020	(0.412)	0.031	(0.371)	0.093	(0.235)	0.003	(0.843)	0.046	(0.345)
Interest rate(T-2)	-0.006	(0.796)	0.028	(0.368)	0.092	(0.203)	0.030**	(0.045)	-0.021	(0.633)
Const.	0.003	(0.304)	0.007*	(0.057)	0.000	(0.964)	0.006***	(0.001)	0.003	(0.584)
R-sqr.	0.1628	(0.034)	0.1571	(0.045)	0.1535	(0.054)	0.1904	(0.007)	0.1666	(0.057)
N of obs.	129		129		129		129		129	