FACTORS EFFECTING EXPORT TRENDS IN UZBEKISTAN

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HALMURZAEV, Alisher

THESIS

Submitted to
KDI School of Public Policy and Management
in partial fulfillment of the requirements
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ABSTRACT

FACTORS EFFECTING EXPORT TRENDS IN UZBEKISTAN

By

AlisherA. Halmurzaev

Research estimated the impacts of external (income levels in trading partners, world prices) and internal (production and domestic consumption of exported goods, exchange rates etc.) factors on changes in total and componential exports of Uzbekistan for the period of 1998-2009 using quarterly data.

The research developed a methodology for quantifying the impact of both external and internal factors on the both aggregate and key product exports of the country. Empirical specification of the model under the study revealed important information about the sensitivities of external trade variables to internal and external factors.

Findings did not reject the hypothesis set – that external factors predominantly explained changes in exports of Uzbekistan. Specifically, changes in the world price levels were the most influential factor in case of total exports as well as its key components: cotton, food, metals and energy. On the other hand, changes in exports of machinery and food have been most responsive to changes in income levels of trading partners. Even though internal monetary policies regarding foreign exchange rates had statistically negligible impacton the changes in exports of machinery, energy, metals and cotton overallimpact of real effective exchange rate on total exports was found to be both empirically and economically significant.

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CHAPTER 1. INTRODUCTION

Current globalization has proven that worldwide economic integration through expanding foreign trade plays important role in economic well being of developing countries. Exports of Uzbekistan have built up significant portions of gross production of the country for the last decade. Even though Uzbek government's mass export promotion policies have been successful in providing stably increasing export growth rates, overall export performance of the economy has been subject to several both external and internal shocks. In fact, Asian financial crisis of 1998 as well as recent global economic slowdown caused the exports of the country to shrink down dramatically. Moreover, domination of commodities and raw products in export structure of the country has been persistent exposing the overall external position of Uzbekistan at various risks related to unexpected changes in world prices and non-price factors.

Therefore, the analysis of the sensitivity of external trade operations to economic external and internal factors is an important study. Current financial crisis makes it even a more important topic in policy making process.

This research intends to identify and evaluate both external (income levels in trading partners, world prices) and internal determinants (production and domestic consumption of exported goods, exchange rates etc.) of exports of Uzbekistan. Following research question is set:

Research Question

What factors play significant role in determining the export performance of Uzbekistan?

To answer this research question, following research objectives are to be carried out:

Research Objectives

1. To discuss changes in changes in exports as well as exports of key products and services of Uzbekistan;
2. To identify internal and external economic factors effecting exports of the country;
3. To build analytical econometric frameworkfor export and its determinants;
4. To analyze the individual and accumulated impacts of internal and external determinants on exports;

The objectives set primarily stress out the effects of the factors representing the current global financial crisis on the exports of the economy. Project presents export performance model for Uzbekistan, its econometric estimations and interpretations on the changes of the exports of key exported product and service groups.

As Uzbekistan is considered to be a small open economy, the research sets the following hypothesis:

H0: External factors (income levels in trading partners, world prices) *predominantly explained changes in exports of Uzbekistan*

Project is structured as follows: Chapter 2 summarizes the empirical literature related to the research area and develops theoretical background to answer the research question. Chapter 3 lays out the methodological framework for the analysis. Chapter 4 provides the results obtain from the statistical and econometrics tests and analysis. Chapter 5 presents the summary of the research findings and concludes the research.

CHAPTER 2. LITERATURE REVIEW

Trade flows play an important role in the process of economic development. Of which, exports deserve a more special emphasis. The studies indicate that, in many developing countries, exports not only generate foreign exchange but also enhance the competitiveness and modernization of the economy and intensify the process of economic growth. Moreover, other studies showed that exports not only enhance short-term growth but also long-term economic performance through various transmission channels. Goldstein and Khan (1982) showed that export growth positively affects the production and demand and opens new opportunities for investments. Maizels (1968) indicated that, the marginal propensity to save is higher in countries with higher exports. Villanueva (1993) stated that investment attractiveness of the country depends on export levels. Countries with high engagement in export process attracted more foreign investments than countries with low investments. Khang (1968), Bardhan and Lewis (1970) indicated that growth rates of exports are one of the main determinants of modernization process of economy with new advanced technologies.

Furthermore, it should be noted that exports are one of the few important channels that link the country with the global economy. This channel also transmits the positive and negative shocks of global economy into domestic economy. The influence of World Financial Crisis of 2009 on other countries was initially spread through financial channels. Countries with closed financial systems, there are few of them, did not face significant challenges during the first phase, while all other countries encountered a significant negative impact through their trade channels in latter phases. Additionally, countries with less diversified exports, such as Russia, Kazakhstan, etc., faced higher challenges during the global financial crisis period.

It also did not leave intact Uzbekistan's economy. Because of the decline in the world demand and the subsequent downturn in the prices for export commodities, it exerted the downward pressure on the profits of Uzbek businesses and the economy overall. To cushion the negative effects of the crisis, the government implemented the Anti-Crisis Program for 2009-

2012 developed with special national economic features taken into account. The measures to support exporters, to ensure their competitiveness in the external markets as well as the establishment of extra incentives for export were one of the main priorities of the program. Although the effectiveness of the program has been noted in a number of literatures, the effect of the global financial crisis was unavoidable for the external position of Uzbekistan. During the global financial crisis, financial systems of Uzbekistan showed stable dynamic performance, however, the transmission through the trade channels was unfavorable. Export growth rates slowed down drastically even though did not show negative trends (State Statistics Office of Uzbekistan, 2012).

The global financial crisis did not only create challenges but also opened new opportunities for developing countries. Many developed and developing countries immediately increased public spending for the creation of more jobs. Although the immediate effect of these policies was favorable, it appears governments did not give much weight to long-term consequences of these policies. As Soros (2009) put it, "The short term needs are the opposite of what is needed in the long term." Global prices for equipment and machineries declined significantly and it was good opportunity for modernization process. Unlike to other countries, Uzbekistan did not fight with challenges of crisis with short term objectives. High portion of government's anti-crisis plans were directed to modernization and enhancement of competitiveness of the economy.

Significant number of studies on identifying export determinants and their empirical estimations has been carried out at both macro and micro levels in cases of developing and developed countries as well as different country groups.

Using quarterly panel data for 1978Q1-2004Q4 on 20 OECD countries Barrell and Pomerantz (2008) models and estimates exports paying close attention to regional integration and technological intensity as key factors. They concluded that impacts of trade liberalizations and technological adaptations perform much better than the factor of competitiveness (such as

prices, export variety etc.) in explaining changes in exports of the countries. They, robustly, impose time dummies for countries joining several regional and global trade agreements to encounter for the effect of globalization which return satisfying econometric results.

Price and income factors have been considered as core determinants of changes in exports in empirical literature. Hooper *et al* (2000) quantifies export's short and long run elasticities for group of G-7 countries[1] relative to income, export prices, exchange rates and volume of total foreign trade activities using error-correction models. For the sample period of 1950-1998, long-run income elasticities exceed unity for all countries except the USA implying to income as the statistical and economic significance of export tendencies of the G-7 countries. Authors also find statistically significant relationships between world prices on exported goods and export growths for five countries except France and Germany in both short and long runs. In case of Japan, findings of Hooper et al (2000) contradict those of Barrell and Pomerantz (2008) in a sense that exports are statistically reluctant to changes in foreign income and price levels in case of former comparing to the latter. In other words, Hooper (2000) finds that Japanese exports are not determined by the changes in foreign income levels and world prices. However, this contradicts the findings of Barrell and Pomerantz (2008).

Furthermore, Senhadji and Montenegro (1999) constructs export models for 75 developing and developed countries using time-series data for 1960-1993[2]. For all sample of countries, exports' elasticities relative to price and partners' income constitute on average -1 and 1.5 respectively. Unit-price responsiveness of exports matches the conclusions obtained in the works of Barrell and Pain (1997) and Barrell and Pomerantz (2008). According to Senhadji and Montenegro (1999) exports of African countries possess lower income elasticities while Asian countries demonstrate higher elasticities with regard to changes in income levels of trading partners. Even though the parameters of the model, which is developed by Senhadki and Montenegro (1999) (the specifications of the model will be provided in the methodology section

[1]G-7 countries are: France, Canada, Germany, Italy, Japan, the UK and the USA.
[2]There are some variations in sample periods by countries.

of the research) have satisfying statistical properties, authors' conclusions might be biased as they use non-stationary time-series data.

In case of developing countries Rafayet (2010) tests whether changes in exchange rate explain the changes in export tendencies of Bangladesh. He employs real exchange rate and real effective exchange rate in order to take price movements in countries into account and concludes that there is no cointegration between exchange rates and exports of the country.The real exchange rate is calculated based on the prices levels in Bangladesh and the US. As the Bangladesh currency is pegged to US dollar. The real effective exchange rate, on the other hand, is calculated based on the price levels in all trading partners of Bangladesh, not only the US.

Streb (2005) assesses the changes in Argentinean exports with regard to changes in exchange rates, partner's income and export prices using quarterly data for 1990Q1-2003Q3. He finds that exports response changes in income levels of the countries which import from Argentina relatively more than prices, and exchange rates do not provide any expected statistically significant properties. Streb's (2005) results agrees with price and income elasticities of Argentina's exports being -0.24 and 1.28 as estimated by Senhadji and Montenegro (1999). As Argentinean economy has limited financial integration into world financial markets and thereof, exports make up a significant contribution to the economic growth of the country, worldwide economic slowdown may have significant negative impact on the potential economic trends of the country.

Homayounifar and Rastegari (2008) analysed effects of economic-political factors affecting non-oil exports of Iran using 1995-2005 data. Being highly dependent on oil exports Iranian economy is highly exposed to risks related to decrease in world oil prices. Conclusions of the research suggests that Iranian non-oil exports is mainly explained by increasing population (0.16), income per capita (0.09) and price levels (0.04) in 15 trading-partners of the country. On the other side, exchange rates (-0.25) and social-political instability (-0.50) factors were

statistically significant factors depressing Iran's export tendencies[3]. All factors enter the export model as external exogenous variables considering Iran as small and 'price-taker' country in world economy.

At industry levels, Abdul-Adis and Sidin (2008) test export promotion strategy (or competitiveness) as a determinant of export performance of furniture industry of Malaysia and find no statistical and direct correlation. Their industry-specific conclusions coincide the macro-level conclusions of Barrell and Pomerantz (2008), Julian (2003) and Akyol and Akehurst (2003), yet, contradict those of Thirkell and Dau (1998) as well as Kau, Koh and Swinyard (1999) who proposed strong positive relationship from export strategy towards export performance in case of Singapore manufacturers.

Dellal and Koc (2003) estimated demand function for apricot industry of Turkey for 1973-2001 years as this country had been largest apricot producing and exporting country in the world. Price elasticity was estimated to be -0.71, additionally, increase in real income and population in trading partners of Turkey stimulated exports. Distinguishing feature of Dellal and Koc's (2003) work is that they include crop or production of apricot as well as domestic consumption of apricot as important internal factors determining the volume of exports. Increase in production of apricot was found to be a statistically and economically significant factor of apricot exports of Turkey. With relatively unchanging prices, one percent increase in domestic consumption would decrease exports of apricot by 0.54 percent. Negative influence of domestic demand factor was also confirmed by Sharma (2000) for India's export growth rates.

Identifying and evaluating export determinants at macro level is undertaken by Jongwanich (2007) for nine Eastern and Southeastern Asian countries (People's Republic of China, Hong Kong, Indonesia, Malaysia, Philippines, Korea, Singapore, Thailand and Taipei) for the period of 1990-2006. He analyzed the exports main product compositions and concluded that increasing diversification of exports, which is reflected by deeper vertical integration, has caused

[3]Values in the brackets represent estimated coefficients of the export model using static OLS method by Homayounifar and Rastegari (2008)

the relationship between exchange rates and exports to become weaker for the period of estimations. Unlike Streb (2005), Senhadji and Montenegro (1999) and Koh*et al* (1999) who mainly stressed out external factors and verified strong statistical relationship between them and export performance, Jongwanich (2007) found that internal or supply side factors are inclined to be more important in determining export trends in case of the Asian countries. Similar conclusions to that of Jongwanich (2007) are obtained from the empirical study by Chan-Olsmted*et al* (2008) for the case of US industries and by Fugazza (2004) for the case of African and Middle East countries.

Along with globalization, international export markets have been getting more and more competitive. Countries are keen on to capture more and more market shares by their exports. Hanson and Robertson (2007) analyzes the effects of explosive growth of Chinese economy and exports as an exogenous factor determining exports of 10 developing countries (Hungary, Malaysia, Mexico, Pakistan, The Philippines, Poland, Romania, Sri Lanka, Thailand and Turkey those more than 75% exports are constituted of manufactures as manufactures made-up 89% of Chinese exports) using gravity model of trade over the period of 1996-2003 years. Their word employs gravity model where the trade among countries are determined by the geographical distance among them. They conclude that if Chinese exports had been constant, exports of the ten emerging countries would slightly 0.6%-1.4% higher for the period. In other words, Chinese exports, being an external shock, do not play significant role for the exports of developing countries.

Analysis of exports of developing countries for the case of Croatia is done by Mervar (2009) using monthly data from January 1990 to December 1993. Using imperfect-substitutes model which assumes that foreign products cannot be perfect substitutes for exports, Croatian exports are estimated against income of OECD[4], price of exports and price of exported products in importing countries as well as imports. Mervar (2009) finds out that if income level increases

[4]As most of the Croatia's trading partners are from OECD, Merver (2009) uses income level of OECD as a proxy for the income of trading partners of Croatia.

or national currency depreciates by one unit Croatia's exports would increase by 1.73% or 0.41%, respectively, on average. Author proposes that price factors were irrelevant in explaining export performance of the country which is not supported by the series of previous literatures including Sharma's (2000) for the case of India.

Furthermore, while estimating export equations for Fiji, Rao and Singh (2005) confirms that relative price levels play important and significant role for export growth rates using the Philips-Hansen and Johansen's cointegration techniques. They criticize Senhadji and Montenegro (1999) and Chan-Olsmted*et al* (2008) for not including exchange rates in estimating effects of relative prices on exports and state that this could overestimate the effects of income on exports. Similar to previous works of Jongwanich (2007), Rafayet (2010) etc. on developing countries, Rao and Singh (2005) suggests higher and more statistical significant effects of income on exports rather than price factors for the case of Fiji's economy.

Global financial crisis shrank the exports of, especially, developing countries. Hufbauer and Stephenson (2009) and Thomas (2009) estimated and analyzed the effects of financial crisis of 2008 on trade performance of emerging countries. Hufbauer and Stephenson's(2009) conclusions suggest that effects of global financial crisis are reflected on the exports of developing countries by enormous drops of income of their trading partners as well as prices of their exports. Downturn of these two external - demand-side factors decreased exports of China and India by average 33%. Their conclusions are also validated by African Union Commission (2009) for 24 African countries both individually and as a whole.

Thomas (2009) estimated the concurrent relationship between exports and net private capital inflows and domestic banking crisis factors which represent effects of financial crisis on trade of developing countries. He concludes that with zero net capital inflow apprehensive domestic banking crisis would decrease the exports by less than 5% which is *"less than suggested by anecdotal evidence in current global financial crisis"* (Thomas, 2009. p. 9). Following Gosh *et al* (2005), estimated coefficient of lagged exports (0.85 and 0.89) and net

private capital flow (1.48 and 1.27) were significant (for manufactures and non-oil commodities, respectively). Capital inflows are also estimated as a determinant of exports by Sharma (2000) for the Indian economy which did not return statistically significant, but with expected positive sign, results. However, theories suggest that foreign direct investments should improve the performance of exporting firms, diversify exports and increase competitiveness of exporting countries. Therefore, in general, these expectations on positive and credible effects of FDI on overall export performance are verified by Fugazza (2004) in his 84-cross-country analysis.

Theoretical expectations on adverse impacts of macro-monetary factors such as price levels and appreciation of national currencies on export performance are tested and approved by Sharma (2000) and Mohammad (2010) for Indian and Pakistani export growth rates respectively. Fan (2002), also, empirically proved that depreciation of currencies of 24 Asian countries would promote the competitiveness of their exports, thus, boost their export growth rates.

As this research carries out analysis of export analysis for Uzbekistan by main product and service compositionssuch as exports of cotton, energy, services etc. as well, it is important to observe more literatures on exports of individual product groups. Similar analysis has been completed for exports of agricultural products of the USA by Shane, Roe and Somwaru (2008). They present simple and accessible method of weighted-income to generate trading-partners' income index. Accordingly, income index is calculated as sum of weighted real GDP of trading partners and, in fact, 1% yearly increase in this index increased exports of agricultural products by 0.75%. Shane *et al* (2008) found empirically significant impact of depreciation of dollar (real effective exchange rate) on agricultural exports: one percent depreciation would increase exports by 0.5%. Similar change in exchange rate did have significantly lower (0.012%) impact on exports of information technology products of the USA as found by Canavan, Carr and Johnson (2002). Hence, it can be inferred that exports of products which are subject to low diversity and high substitutability or raw products incur high sensitivity towards determinants of exports.

CHAPTER 3. METHODOLOGY

Approach combined of both quantitative and qualitative research methods is employed within the research project. The empirical hypothesis test makes up the core aspect of quantitative research method being employed. Even though the nature of the research is denominated mainly of numeric data collection and analysis, the overall analysis is enriched of qualitative diagnoses as well.

The data for the analysis is obtained from official statistical bases of the Republic of Uzbekistan as well as those of International Financial Institutions (e.g. World Bank, International Monetary Fund, UNCTAD). The reliability of the data is ensured by mirror-data comparison from different sources.

Statistical, econometric and empirical quantitative analysis methods ensure the precision of the results. The sampling period is also controlled for checking robustness of the findings.

Econometric Modeling Export Performance

Research followed modeling framework of Senhadji and Montenegro (1999) and Mervar (2009) for quantifying impacts of external and internal factors on exports of Uzbekistan. Accordingly, exports were determined by following general model:

$$EX=F(GDP^{PART}, PRICE^{WORLD}, EXR, VECTOR, ARMA) \quad (1)$$

The justification of the model is provided below. Model predicts that exports and export compositions of Uzbekistan are determined by: GDP^{PART} – income index of trading-partners; $PRICE^{WORLD}$ – world price levels of exports (as Uzbekistan is developing small economy, it was

assumed that country is price-taker just as Argentina, Singapore, and Turkey etc.); EXR - exchange rates; VECTOR – vector of other factors such as domestic production and consumption of exported products etc.;

ARMA – represents autoregressive process or moving average process or combination of both – included in the model to capture the effects of lagged values of dependant variables in regressions. Most of the empirical literatures reviewed above were concentrated on the significance and consistency of price and elasticity coefficients using OLS estimation methods. However, that the estimation results could be biased due to endogeneity problems caused by the simultaneity of the import and export quantities together with their prices was pointed out in 1950s (Orcutt (1950), Harberger (1953)). Endogeneity problems were addressed following decades by authors such as Goldstein and Khan (1978) and Marquez and McNeilly (1988). Their proposition was to use simultaneous equation models to avoid endogeneity biases. Furthermore, in their later works, these and other authors also made proposals of the use autoregregressive distrubutive lag models to account for autocorrelations and moving average features in the times series under consideration that might bias OLS estimations.

The empirical specification of model in this project basically relies upon the imperfect substitute model summarized by Goldstein and Khan (1985) as this approach summarizes all the main determinants of export flows of countries i.e. the exports of a country are a function of export prices, exchange rates and the income level of trading partners of Uzbekistan. Therefore, the model incorporates a key assumption that the traded products between importer country and exporter country are not completely homogenous; e.g. they do not render a perfect substitutability between each other in consumption. This assumption is quite realistic and has found extensive empirical support by number of empirical studies. For instance, Ostry and Reinhart (1992) conducted a study in which the intra-temporal elasticity of substitution between traded and non-traded goods was estimated for a broad number of developing countries. The estimated parameter lied between 1.0-1.5 in all the regions under study implying their gross

substitutability. Imperfect substitutability also found its empirical confirmation in later works of Ogaki, Ostry and Reinhart (1994).

The estimation of the model requires proper measures of included determinants (foreign income levels, real effective exchange rates, export prices). Pre-requisite conditions need also to be considered for model estimations and making conclusions.

Calculating Income Index of Trading Partners

To measure the effect of foreign income levels on exports of Uzbekistan different approaches can be used. First approach is to use separate variable for each country. This method requires inclusion of many variables and reduces the efficiency of estimation thus threats to validity of the research findings. Additionally, inclusion of many time series into the model will generate so-called "multicolinearity problem" and create problems during econometric hypothesis testing processes.

The most proper way of measuring the foreign demand approximated by the income levels of trading partners of Uzbekistan is to follow the methodology of Shane *et al* (2008) and Mervar (2009). Accordingly, external factor of income index of trading partners of Uzbekistan is calculated by weighting the average growth rates of income of trading partners as:

$$GDP\_PART = \sum_{i=1}^{23} GDP_i * w_i \qquad \textbf{(2)}$$

In case of Uzbekistan, 23 top trading partners, with highest shares in exports of the country, were chosen for the period of 1998Q1-2009Q4 which constituted over 75% of total foreign trade for the country[5]. GDP_i is the real annual GDP growth of partner-country *i*, w_i is the corresponding weight of the country in total trade activity of Uzbekistan. Weights were calculated as ratio of exports to country *i* to total exports of Uzbekistan in that quarter.

[5]Chosen top trading-partners of Uzbekistan were: Austria, Belgium, Great Britain, Germany, Israel, Iran, Italy, China, Korean Republic, Latvia, Netherlands, USA, Turkey, Finland, France, Switzerland, Japan, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan and Ukraine.

However many trading partners have quarterly data only for recent years. This is common for developing economies such as Russia, Kazakhstan, etc. as well. However, the data set of EIU provides annual data for all countries under the study. These annual series were interpolated using Chow- Lin method (Chow, 1971). The interpolated series are checked for statistical consistency in order to prevent reliability issues. Moreover, this is a reliable approach as only 7 trading partners of out of 25 have annual data series available. Although the Chow-Lin method does not guarantee the data coincidence between the actual series and adjusted interpolated series, it is still an important and frequently used statistical tool, because it allows for the optimization of data interpolation estimator from lower frequency to higher frequency (Ernest Pons Fanals, 1997).

The strategy of measuring the foreign income levels of trading partners of Uzbekistan is accurate as it allows the econometric estimations for more degrees of freedom. Weighted real GDP growth of trading partners can be considered as an important indicator of foreign income and it is an important determinant of foreign demand for Uzbekistan's exports.

Export price index

Estimation of the model developed effects of export prices on exports of Uzbekistan should also be controlled for. However, even though the world prices on individual export products are straightforward the proxy for aggregate export price is ambiguous. As Uzbekistan is a small open economy the prices of world prices on individual exporting products are exogenously taken. This is consistent with economic theories and forms a reasonable proxy.

Moreover as exports of Uzbekistan are consisted of significantly large number of products and the calculation of a single aggregate price index is a complex process. Thereof, price index levels of total exports are measured by summing weighted annualized price changes

of four most-exported composition groups: cotton, food, energy and metal and other products. As measurement units were different for those four export compositions, annual changes in their world prices were used to generate annualized changes in prices of total exports of Uzbekistan. Following formulae was used:

$$PW\_EX = \sum w_i * pw\_comp_i \quad (3)$$

Where *PW_EX* is total export price levels, w_i is weight of export composition *i* in total exports, and pw_comp_i is price of corresponding export composition (cotton, food, energy or metal and other products).

Measuring of Real Effective Exchange Rates

According to the model specifications, the changes in exports of Uzbekistan to its trading partners depend on relative prices. The series of relative prices are proxied by the real effective exchange rates (EXRR) as it captures both effects related to the price of currencies and price of goods subject to trade. Inclusion of exchange rate as a determinant of exports required challenging and tough analysis. As presented in reviewed literatures, exchange rates may not be significant in explaining export trends of developing countries such as Uzbekistan where exports were controlled by non-monetary policy factors and where noteworthy differences prevailed between official and non-official exchange rates. Real effective exchange rate was calculated and included in estimations as suggested by Abeysinghe and Yeok (1998) as well as Jongwanich (2007):

$$EXRR = EXR * \frac{CPI^{UZ}}{CPI^{PART}} \quad \textbf{(4)}$$

Where *EXRR* is real effective exchange rate, *EXR* is official nominal exchange rate; CPI^{UZ} and CPI^{PART} are price level changes in Uzbekistan and trading partners of the country represented by consumer price indices. CPI index for 23 trading partners of Uzbekistan is generated by weighting scheme of: $CPI_t^{PART} = \sum_{i=1}^{23} CPI_{i,t} * w_{i,t}$, where $CPI_{i,t}$ is CPI of partner-country *i* at quarter *t* and $w_{i,t}$ is share of partner-country in total trade of Uzbekistan at quarter *t*. Adoption of CPI as representative of price levels was based on arguments that CPI was constructed on similar basis across countries (Fugazza, 2004) and availability of data for all countries. Exchange rates entered estimations in form of UZS/USD that increase in exchange rate implied to depreciation of national currency – sums.

Econometric Pre-requisites on Variables

Later works more focused on testing and incorporating the inherent non-stationarity feature into the time series model. In 1990s, the studies of Rose (1991), Senhadji and Montenegro (1999), and Reinhart (1995) have shown that exports and their relative prices are all unit root processes. The presence of unit roots may seriously bias OLS estimator and lead to spurious relationships and biased results. This has made the identification of the features of time series data an important element in the analysis. Therefore, the empirical literature recommends the use of estimators such as the Dynamic OLS (Phillips and Hansen (1990), Phillips and Loretan (1991), Saikkonen (1991)) or the Fully Modified Least Squares (FMLS) (Phillips and Hansen (1990), Hansen (1992). For the multivariate case, the Johansen's (1988, 1997) cointegration approach is used.

The literature has investigated export tendencies of different countries and country groups in the presence of unit roots in the variables and thus employed the methodologies under cointegration framework. Our approach also takes into consideration the non-stationary features of trade flow variables for the case of Uzbekistan.

It was primitive for the employed time series data in the project to be stationary in order to assure the precision and accuracy of econometric estimations of export performance models for the case of Uzbekistan. Adopting from Senhadji and Montenegro (1999) and Streb (2005), the Augmented Dickey-Fuller tests were undertaken for all variables by estimating following form of regressions:

$$\Delta Var_t = \alpha_1 + \alpha_2 t + \alpha_3 Var_{t-1} + \sum_{i=1}^{m} \beta_i \Delta Var_{t-i} + e_t \quad (5)$$

Where Var_t is variable, t is trend and m is length of lags of the variable which makes the error term of the regression $e_i$serially uncorrelated (Gujarati, 2003); length of lags were chosen using Schwarz Info Criterion.

In order to verify long-term relationships between export and its determinants, research utilized Augmented Engle-Granger Cointegration tests whose methodology had been adopted from Hooper *et al* (2000). Finally, within estimations to reassure that coefficients of export performance models are not biased, project employed Breusch-Godfrey LM test to detect whether there existed serial correlation in the error terms of the regressions.

Data Sources

Project used quarterly data available from 1998Q1 to 2009Q4 for the analysis. Data were collected from official and reliable online sources and no primary data were used. Monthly nominal exchange rates were obtained from the Central Bank of Uzbekistan and converted to quarterly terms. Foreign trade, price levels and other macroeconomic indicators of Uzbekistan and its trading partners were originated from State Statistics Committee of Uzbekistan, World Economic Outlook 2009, World Trade Statistics 2009 and World GDP (WB, 2009) reports.

World prices for the export compositions of Uzbekistan were obtained from World Bank (2010) online databases.

Data were gathered on seven product groups which composed-up total exports of Uzbekistan. They were: exports of cotton, food items, machinery, energy, services, chemicals, and metal and other products. World price levels for three export compositions of Uzbekistan (chemicals, services and machinery) were neither accessible nor available in sources**.** Therefore, changes in their export and exports of individual products and services are estimated with related available determinants.

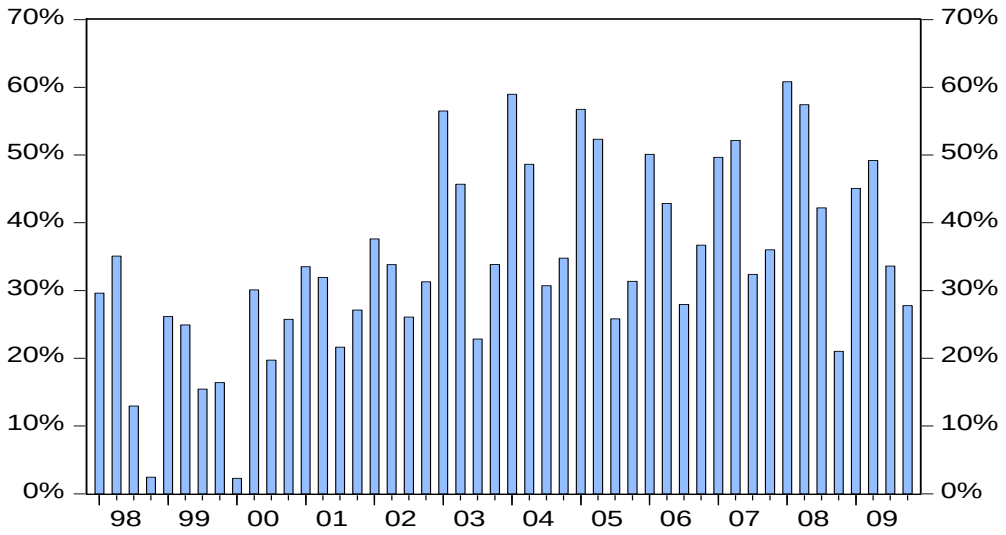
Allvariables on exports and export compositions were transformed to real terms using their corresponding price-deflators and, then, annual percentage changes were calculated in order to make all variables in one unified annual-percentage-change forms. It is important to note that annual quarter-to-quarter changes are calculated as Q/Q(-4) – ratio of one quarter to the quarter in four lags. Therefore, 1 (or 100%) refers to no (or 0%) annual change. Using quarterly data in the analysis created the issue of seasonality (e.g. in export some compositions such as cotton and food products). Therefore, instead of using dummy variables to sterilize effects of seasonality as Dellal and Koc (2003) done so, all variables were deseasonalized using multiplicative method of E-views 7 software.

CHAPTER 4. ANALYSIS AND FINDINGS

Ch 4.1. Analysis of changes in tendencies and composition of exports

Exports have been a crucial contributor to the high economic growth rates of Uzbekistan for the last decade. Figure 1 below illustrates the share of exports in GDP of Uzbekistan for the period of 1998-2009 years.

Figure 1. Share of Exports in GDP of Uzbekistan (1998Q1-2009Q4)



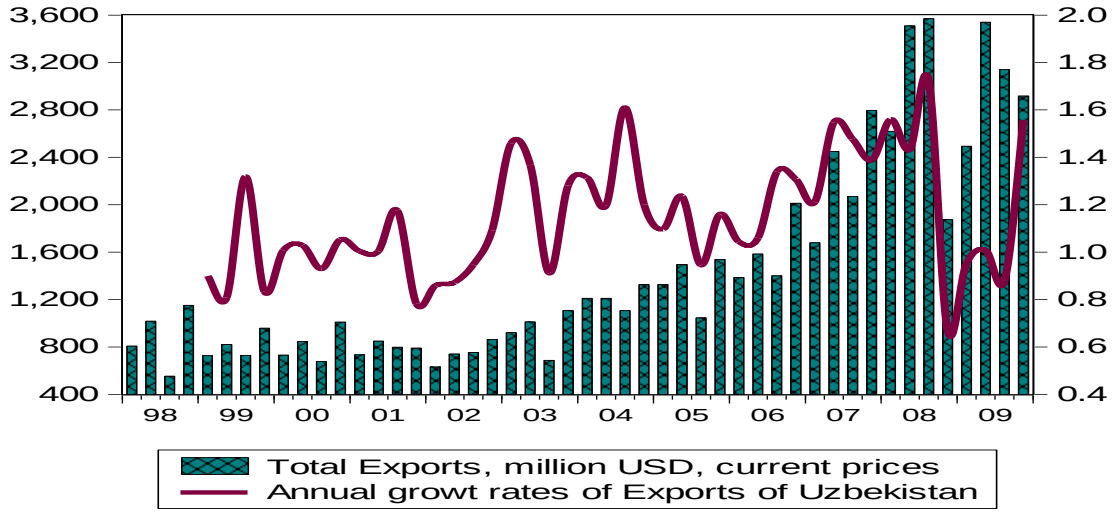
Note: Numbers are calculated ratios of nominal USD values of quarterly exports to those of GDP.

For 1998-2009 years exports constituted 34.3%, on average, of GDP. Share of exports in GDP were on their floor levels in 1998 (25%) and 1999 (21%) years when Asian financial crisis hit the world economy. From 2000 to 2008 significance of exports for Uzbek economy increased rapidly. Starting from 2003, as a result of government's export-promotion policies, one can observe a structural shift in the shares of exports in GDP. As of first quarter of 2008, nominal volume of exports reached to 60.8% of country's GDP. By the end of the last quarter of 2008 this number was only 21% which is almost twice smaller than that in previous year. This can be considered as commencing effects of current global financial crisis. Coming to 2009,

significance of exports slightly recovered when its share in GDP was average 36%. In general, exports have played one of the importance and key roles in economic development of Uzbekistan for the analyzed period.

Being an important macroeconomic factor, exports have been exposed to number of desired and undesired influences. Even though exports demonstrated increasing trend for 1998-2009 overall with average annual growth rate of 15%, beginning phase of the period was critical (Figure 2). From the mid 1998 to the first quarter of 2002 exports declined by 13.6% annually from 1017.2 to 731.5 million USD. Low exports during 1999-2000 were mainly because of decreased demand resulting from Asian crisis while similar export volumes during 2001-2002 were results of sharp downturns in export prices. Beginning from 2003 exports rose significantly by 21.7% yearly (on quarter-to-quarter basis). Quarterly exports reached its peak 3569 million USD in the third quarter of 2008 which is almost four times greater than that in first quarter of 2003. In the end of 2008 Uzbekistan had 1874 million USD worth exports which were only 67% of fourth quarter of previous year. This 33% annual downturn was the worst shock Uzbekistan's exports face during the period. Recovery rates were average 9.9% during the four quarters of 2009.

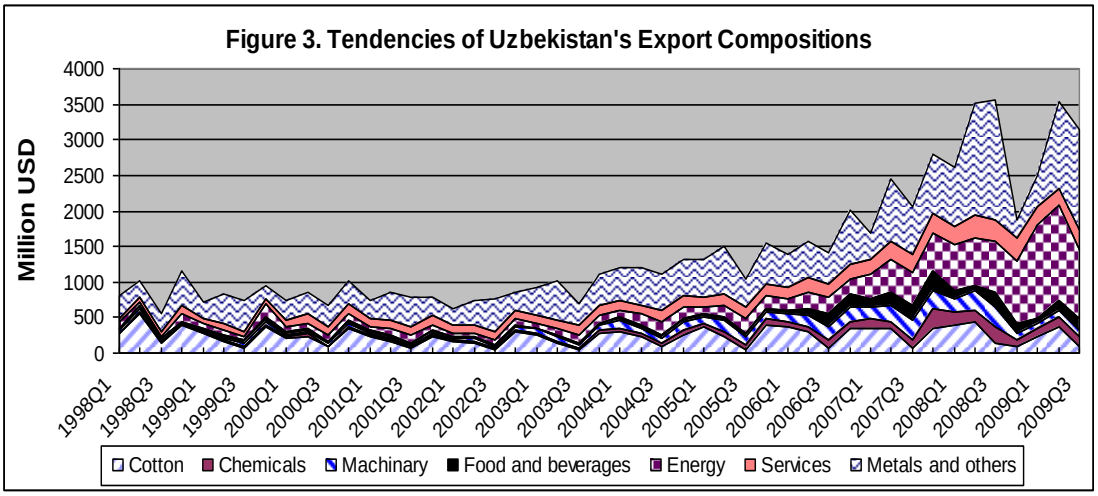
Figure 2. Export tendency and export growth rates



Note: Export volume is measured by the right axis and is given in million USD terms.Growth rates of exports are calculated as percentage changes relative to the corresponding quarter of previous year.

In summary, the fluctuations in export growth rates have been noticeable especially during three periods: 1) as a result of negative impact of external factors on exports during the Asian financial crisis of 1998; 2) During 2001-2002 – when the commodity prices declined significantly in international markets; and 3) during 2008-2009 – when the demand side factors shrank when the global economy was subject to consequences of financial crisis.

Analyzed total changes of exports of Uzbekistan emerged from incremental varying trends of seven components. Figure 3 shows that exports of cotton and metals have been dominant in total exports of the country. This implies that throughout the 1998-2009 period factors affecting these two compositions have also influenced total exports significantly. Quarterly cotton and metal exports made-up on average 237 and 523 million USD, respectively. Uzbekistan's export earnings from cotton have been very volatile with unchanging trend as cotton is regarded as a raw material. On the other hand, earning from metal exports sharply increased from the second quarter of 2004 onwards. Nominal metal exports reached it peak in the third quarter of 2008 with 1690 million USD. Government's trade policies which are directed to exporting ready-products and import-substitution have played key role in export diversification. In this sense, exports of machinery significantly rose for the second half of 1998-2009 and reached 932 and 874 million USD in 2007 and 2008 respectively.



Note: Values on export compositions are shown in million USD terms at current market prices.

Development of services sector can be realized by the fact that foreigners used on average 160 million USD worth services of Uzbekistan quarterly. Surprisingly, when financial crisis depressed exports of metal and machinery enormously by 1432 and 172.3 million dollars from third to fourth quarter of 2008, earnings from exports of services and energy were not influenced seriously. In fact, this predicts that services and energy compositions of exports have been relatively insensible to global financial crisis. Uzbekistan's exports were strongly dependant on energy and energy carriers especially from 2006 on. Since then on average 330 million USD worth energy were sold to other countries quarterly. Recovery of exports from the consequences of global financial crisis was done mainly though selling three key components: metals, energy and cotton. In fact, highest energy exports were recorded as of first (1308 million USD) and second (1326 million USD) quarters of 2009. This means that dependency of Uzbekistan's exports on key components prevailed as of last year.

In summary, starting from 1998, growth of exports was mainly stimulated by growth in exports of energy, cotton and metals and others. Volume of cotton exports has had relatively constant trend. On the other hand, volumes of energy and service exports have noticeably increased moving towards the recent years.

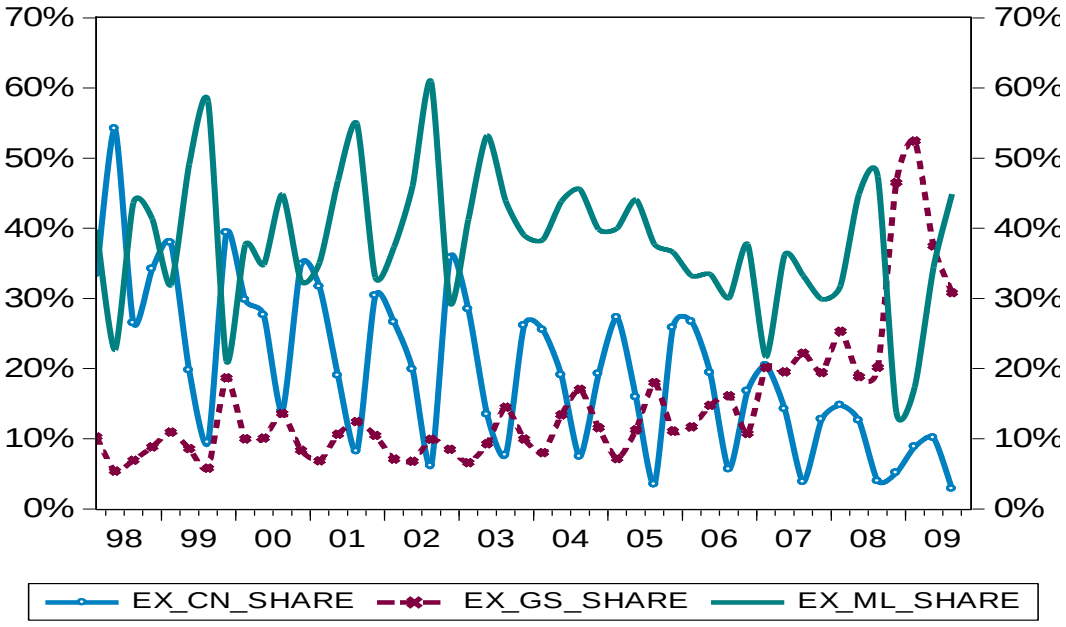
In order to evaluate individual roles of each composition group, their shares in total exports are calculated. For clarity purposes, shares of export compositions are illustrated by separate graphs. Shares of top three exported products (cotton, energy and energy carriers as well as metal and other products) in total exports are shown by Figure 4.

For the first half of 1998Q1-2009Q4 quarterly cotton sales constituted average 28.1% of total exports while this number was just 17.8% in the second half of the same period. With seasonality factor in cotton production, total exports mainly elevated in the first and second quarters. It is favorable that Uzbekistan's exports are becoming less and less dependent on cotton which can mainly be explained by the internal policy instruments promoting the domestic textile industry and diversifying export structure.

Shares of metal and other products have been highest among other components with quarterly average value of 38.2%. They, however, demonstrated overall declining trend coming to the end of 2009. Volatility in metal's shares is significant during the periods of instability of world economy.

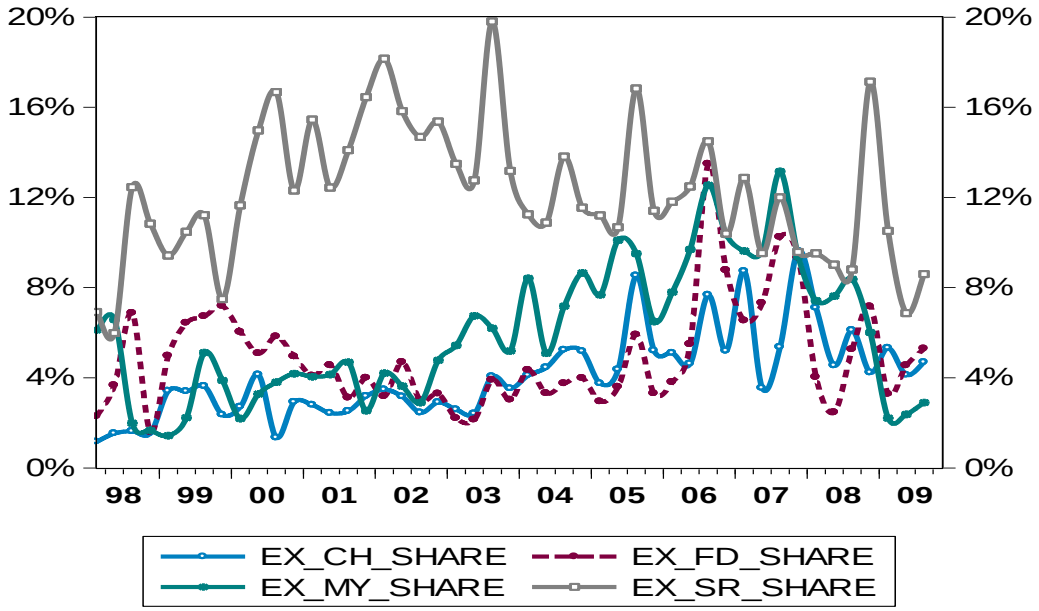
Portion of energy in total exports was between 7%-17% interval in most of the cases. From 2007 on, this number considerably increased to average 28.5%. Even though the share of energy (mainly natural gas) in total exports has had steady trend until the end of 2007, from the beginning of global financial crisis, one can notice that, energy exports were one of the strong short-term components keeping the overall export volumes of the country sustainable. It is important to state that Uzbekistan has maintained total export levels by 'compensation' scheme--that when shares of cotton decline, exports of metals increased in order to compensate.

Figure 4. Shares of Cotton, Energy and Metals in Total Exports of Uzbekistan



Next important identified export component – services have overall possessed considerably higher shares in total exports than food, chemicals and machinery (Figure 5). On average, services, food, chemicals and machinery constituted 12.2%, 4.9%, 4.1% and 5.9% of quarterly total exports for the period being analyzed. Shares of latter three components have slowly increased in contrast to overall decreasing trend of shares of services.

Figure 5. Shares of Chemicals, Food, Machinery and Services in Total Exports of Uzbekistan



Finally, in the beginning of current financial crisis shares of all components except those of energy and services declined sharply. Recovery processes in 2009 have been relatively fast in exports of cotton and metals comparing to other export compositions.

Ch 4.2. Tendencies of internal and external determinants of exports of Uzbekistan

Changes in total exports and export components are caused by external and internal factors. Research identified income of trading partners and world price levels for exports as external factors determining changes in export volumes of Uzbekistan. Income factor affects Uzbekistan's exports in direct way that if income levels in trading partners change, their decisions on consuming the country's exports change. Small and emerging economy of Uzbekistan participates in worldwide trade markets as price-taker country. This means prices for country's exported products are determined not by the country but by the market factors. Therefore, price levels are also considered as external factors. Below conclusions on constructed/identified external determinants of exports are provided:

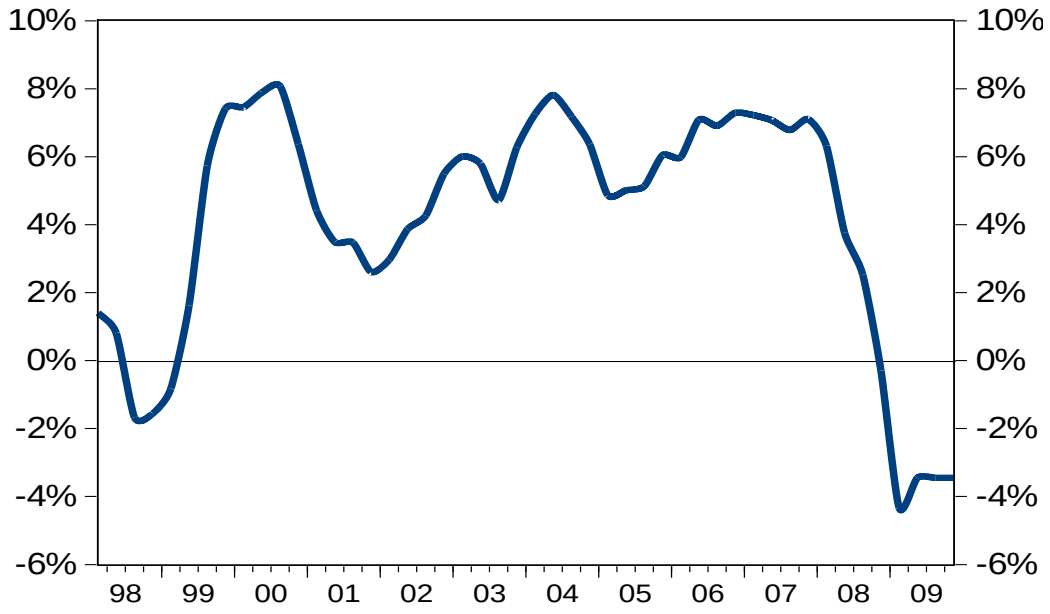
Foreign Income Index

Constructed trade-weighted-income-index of 23 partner countries is demonstrated in Figure 6. Income of partner countries increased on average by 4.14% annually[6]. Constructed index demonstrated highest growth rates in 2000 (8.08%), 2004 (7.5%) and 2007 (7.1%) years implying that Uzbekistan's total foreign trade in these years were mostly associated with countries with boosting economies. In 11% of cases, income index demonstrated real GDP

[6]'Annually' refers to real growth in one quarter relative to the same quarter of previous year.

growth of partners to be 6%-8% annually. Trading partners, in general, faced negative real economic growth rates only during the two crisis periods within 1998Q1-2009Q4.

Figure 6. Index of Income of Trading Partners of Uzbekistan



Note: This foreign income index is measured as annual percentage changes and in real terms.

Because of Asian financial crisis of 1998, yearly economic growth was -1.6% in the second half of 1998. Recovery from the crisis period appeared soon in 1999Q2 with real annual growth rates of 1.63%. Impacts of global economic financial crisis are reflected in income index from the last quarter of 2008 when it was recorded as -0.29%. Further and highest decline in real economic output of 23 trading partners was -4.33% in 2009Q1 relative to the similar quarter of 2008. Hence, countries whose shares were dominant in Uzbekistan's total trade were more and more adverse hit by the crisis. Income index never healed to positive number until the end of previous year. In general, real economic growth index was highly varying with variability coefficient of 84%[7].

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[7]Variability is, robustly, measured by the ratio of St. Dev. to Mean.

Figure 7. Income Index vs. Economic Growth of Russia

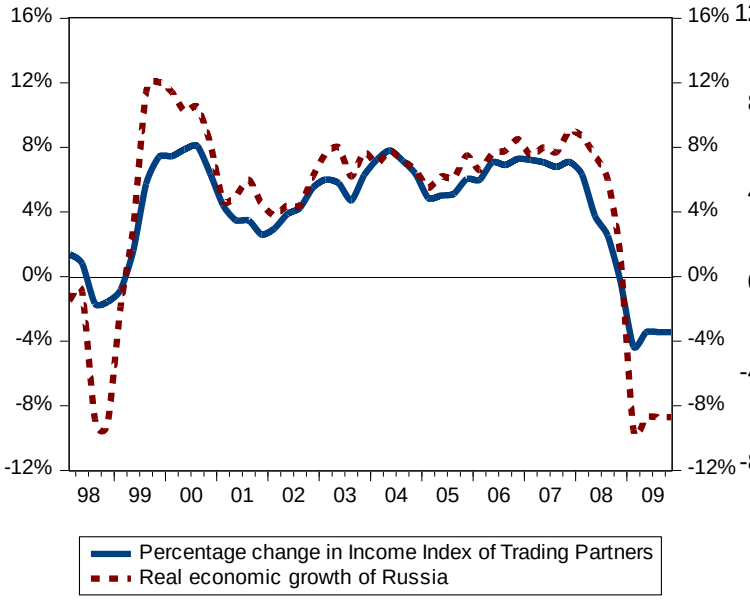


Figure 8. Income Index vs. Real Economic Growth of Germany

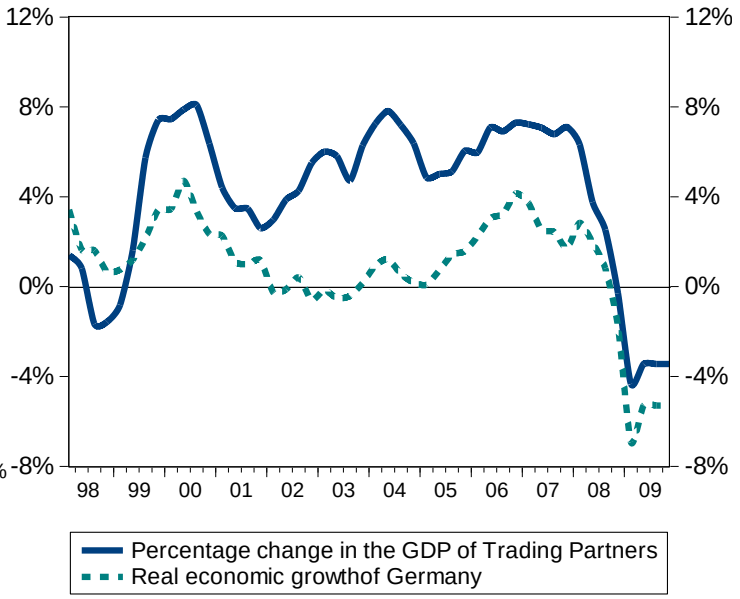


Figure 9. Income Index vs. Real Economic Growth of Korea, The Republic of

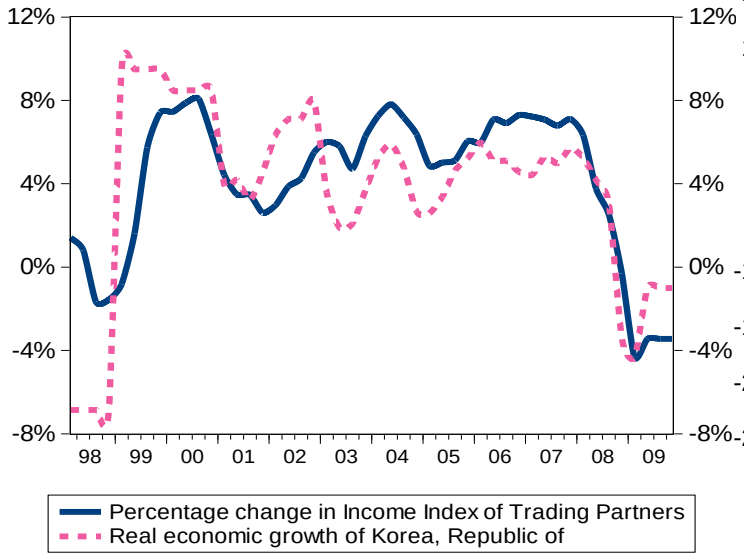
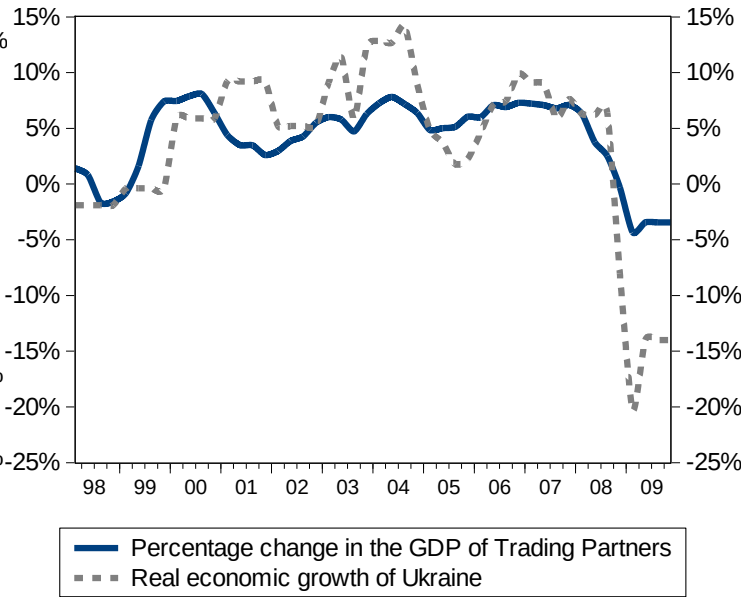


Figure 10. Income Index vs. Real Economic Growth of Ukrain



In order to check how well the constructed income index performs in representing the income growth rates of trading partners of Uzbekistan, index is compared to annual real GDP growth rates of four countries whose shares were highest in total trade of Uzbekistan

Trade with Russian Federation constituted highest 18%, on average, of Uzbekistan's total foreign trade activity during 1998-2009. Therefore, income index well fits real economic growth rates of Russia (Figure 7). During the financial shock periods, however, Russia's real output enormously declined by average -5.7% and -8.9% annually in 1998 and 2009 years comparing to

the income index. This means that the partner country's economy was much more sensitive and exposed to external shocks. Importantly, extreme downturns in 1998 and 2008-09 years as well as sudden upturns in 2000 of income index were mainly due to even more extreme changes in Russian economy.

Slightly different conclusions can be made in comparison of the income index with real economic growth of Korea whose share was 8.7%, second largest, in total trade of Uzbekistan (Figure 9). Overall, income index well fits the growth trends of the partner economy which refers to further reliability of the constructed income index. However, unlike Russia index overestimates the GDP growth of Korea during 2003-2007 years which means that trade between Uzbekistan and Korea has slowed down, thus, the weight of Korea has been lower than average in this period. Adverse impacts of Asian financial crisis of 1998 were equal in case of Korea as Russia. Income index almost perfectly represents the effects of recent global financial crisis in case of Korean economy. Yet Korean economy has recovered with much faster speed than the income index predicts in 2009.

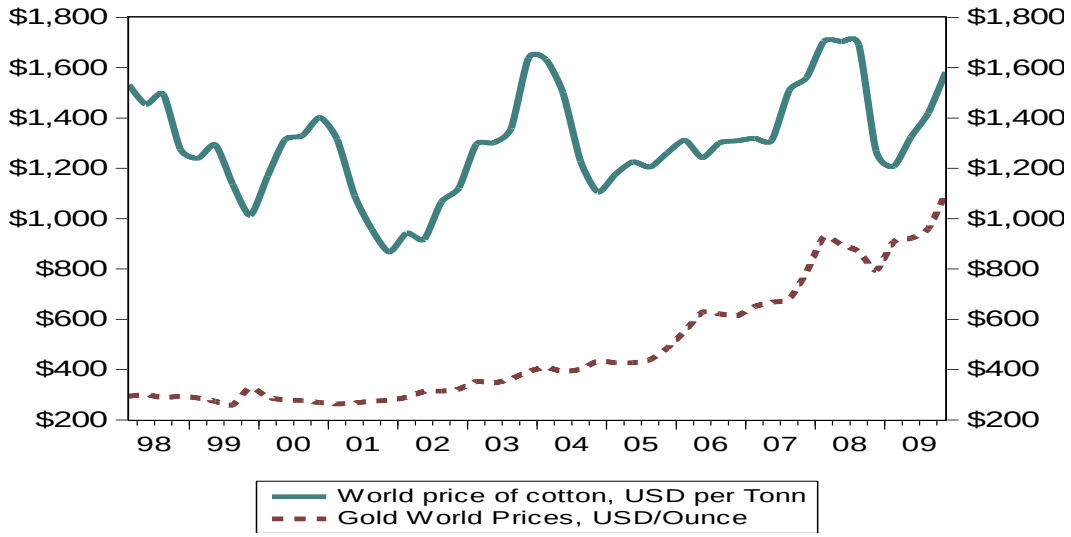
Income index does poorly in representing economic performance of Germany rather than Ukraine whose average shares were 5.2% and 3.7%, on average, respectively. Countries faced average annual real GDP growths of 0.91% and 3.78% in that order for 1998Q1-2009Q4. These facts imply that significant portion of trading partners of Uzbekistan have been emerging economies – trade with these economies with high economic growth rates have made-up significant portion of total foreign trade of Uzbekistan. Ukraine with -20% economic recessions in 2009Q1 has also played key role in pulling the income index down to lowest -4.3% level during the recent financial crisis period.

World Prices on Export Products

As reviewed literatures revealed, export prices also play important role as external factors controlling export flows of Uzbekistan. Price levels and indices in international trade markets are considered as export prices for the export compositions.

Actual prices for cotton and metals in world markets are shown in the Figure 11 below. As more than 90% of exports of metal and other products are constituted of earnings from gold exports, world gold prices are taken as proxies for the export composition group. In order to observe annual changes in

Figure 11. International Prices for Cotton and Metals

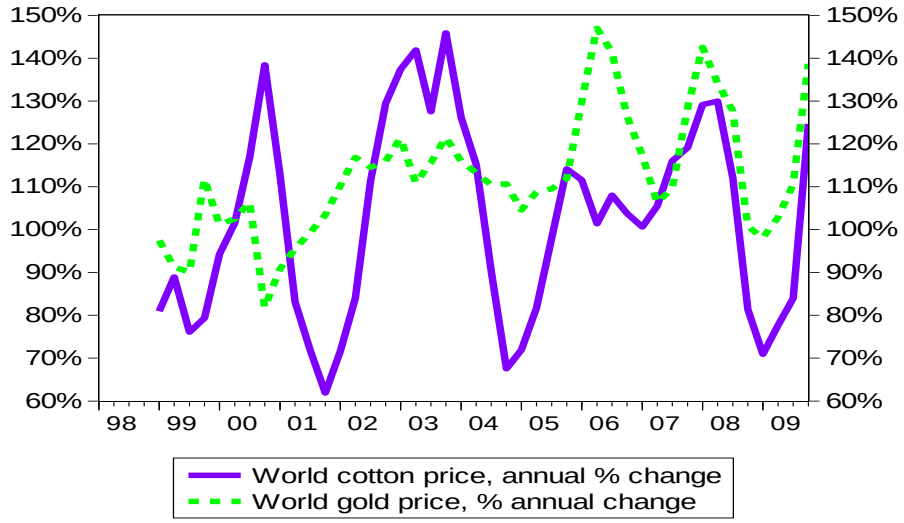


Note: Cotton prices reflect USD per ton units and gold prices are reflected in international standard units of USD per ounce.

World price levels for cotton in international markets have been much more volatile comparing to those of metals (Figures 11 and 12). Theoretical proposals that earnings from exports of raw materials are at high risks associated with sudden and significant changes in their prices are verified with research's conclusions. External shocks as consequences of financial crises are well represented by downturns in world cotton prices from 1531USD/Ton in 1998Q1 to 1012USD/Ton in 1999Q4 and from 1700USD/Ton in 2008Q3 to 1208USD/Ton in 2009Q1 or

equally by 20% and 30% respectively. Not only during crisis periods but also reaching to the ends of 2001 and 2004 years world cotton prices declined sharply by 39% and 33%, in annual terms. Therefore, it can be concluded that reliance on exports of raw materials such as cotton in case of Uzbekistan is a risky trade decision. Because, being a low-necessity product, their prices demonstrate significant and unexpected swings in world markets.

Figure 12. Annual changes in World Cotton and Metal Prices

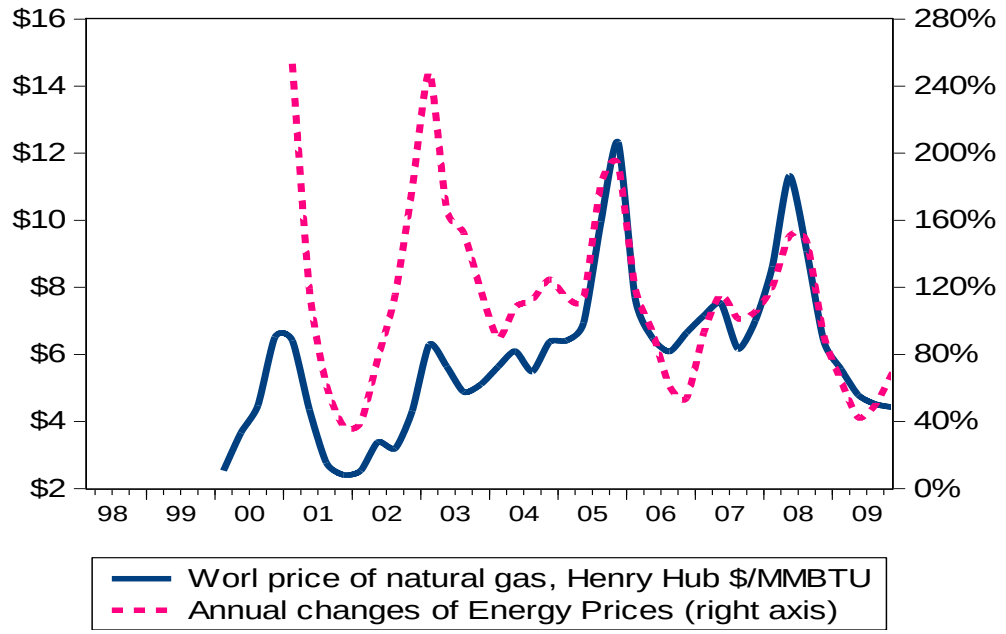


Note: 100% line indicates no annual change. In other words, axes of the diagram determine what portion a quarter constitutes of the same quarter of previous year

World gold prices, taken as proxies for metal export prices, have gradually increased from quarter to quarter during 1998-2009. Gold prices on average elevated by 12.4% annually and increased from 294USD/Ounce in 1998Q1 to 1101USD/Ounce in 2009Q4 (Figure 11 and 12). Constantly increasing gold prices can be explained by the fact that reliability of world currencies has been decreasing and gold has become more secure source for saving wealth of nations and individuals. Consequences of crisis periods have been reflected by slight downturns of metal prices by -2.4% in 1999 and only 2% in 2009Q1. Yet gold prices much faster recovered from crisis's impacts and by 2009Q4 they were 38% higher comparing to the similar quarter of 2008.

Considering the fact that significant portion of Uzbekistan's energy exports are made of selling natural gas to other countries, international Henry-Hub index is taken as proxy for the price of energy exports (Figure 13).

Figure 13. Trend of World Energy Prices and its Changes

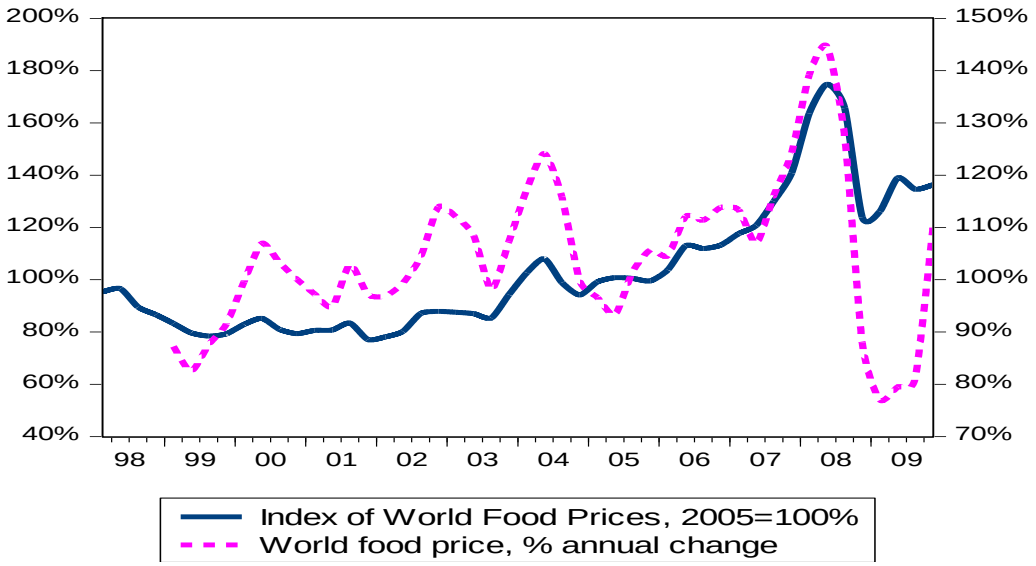


Note: Natural gas price is measured in USD/MMBTU (Millimeter British Thermal Unit) (the left axis). The annual growth rates are measured by the right axis in %.

Price levels for energy exports of Uzbekistan are represented by world natural gas prices as natural gas sales have dominated export earnings from the component. Like cotton prices, energy prices have also been subject to relatively high fluctuations (Figure 13). On average, one MMBTU gas was sold for 5.93 dollars in world markets and prices increased by average 12% annually. Gas prices showed three considerable downturns for 1998-2009: in the second half of 2001 by -51%, in pre-crisis period of second half of 2006 by 47% and after crisis period of first half of 2009 by 47.1%. Peak energy prices were recorded in 2005Q4 (12.3USD/MMBTU) and in 2008Q3 (11.3USD/MMBTU) with corresponding annual growth rates of 93.4% and 55.5%. Prices for energy exports of Uzbekistan did posses volatile and unpredictable nature.

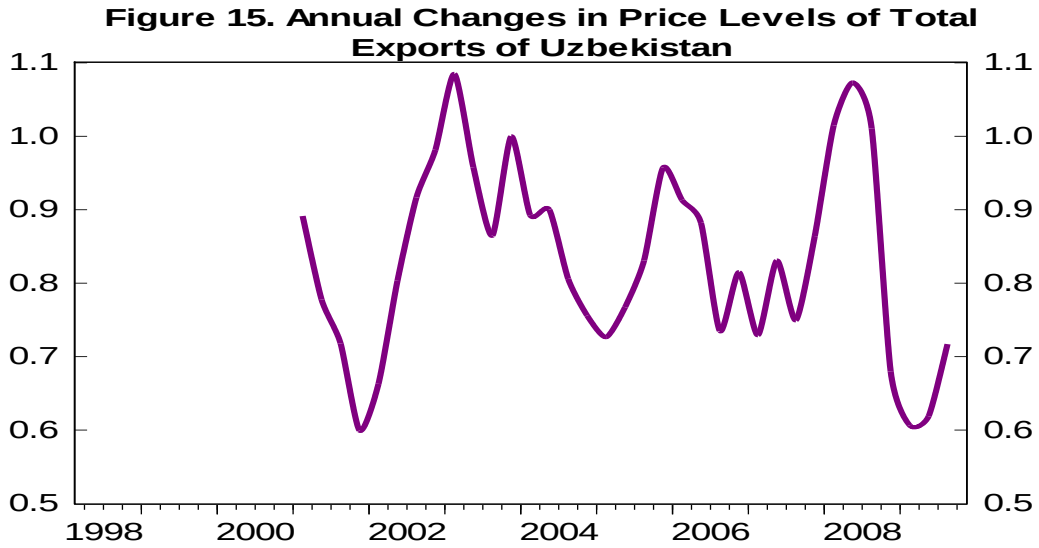
Following the slight downturns after first crisis, world food prices steadily increased by 4.5% annually (Figure 14) for 2001-2008. Prices for food exports in world markets reached its peak in 2008Q2 when they were higher by 74.8% and 44.5% comparing to those in 2005 and 2007 respectively. Strong volatility in food prices during 2000-2005 and 2008-2009 years has disturbed Uzbek food exporters by creating uncertainty issues.

Figure 14. World Index of Food Prices and its Changes



Price levels for total exports of Uzbekistan were generated by weighting the annualized changes in price levels of four above presented export compositions (see methodology section for details). Annual changes in the price index for total exports have been more or less stable for 2001-2009 years. They have demonstrated that export price have declined by 17% annually during the period. Uzbek exporters enjoyed highest yearly price rises of 8.5% and 7.3% in the first quarter of 2003 and the second quarter of 2008 respectively. Contrarily, highest annual drops by -40.1% and - 39.4% in export prices was observed as of the ends of 2001 and 2008, respectively, where the latter was the consequence of recent economic slowdown. Strong volatility of export prices in the case of Uzbekistan was mainly due to the fact that world prices for cotton and energy export compositions were greatly fluctuating. Accumulated shares of

cotton and energy in total exports surpassed those of metals whose prices were relatively calm during the ten years.



Note: Unit (=1) line refers to no annual change.

Below table 2 provides summaries and general descriptive statistics on annual percentage changes of four above presented price factors as well as total export price levels: changes of cotton prices (PW_CN_Q4), food prices (PW_FD_Q4), metal prices (PW_GD_Q4), energy prices (PW_GS_Q4), total exports (PW_EX_Q4):

Table 2. Descriptive Statistics of Price Factors

	PW_CN_Q4	***PW_FD_Q4***	***PW_GD_Q4***	***PW_GS_Q4***	***PW_EX_Q4***
Mean	*1.021852*	*1.044423*	*1.123785*	*1.134956*	*0.832419*
Maximum	*1.458874*	*1.446929*	*1.469660*	*2.532835*	*1.084816*
Minimum	*0.618453*	*0.770446*	*0.817946*	*0.369551*	*0.599520*
Std. Dev.	*0.228961*	*0.145147*	*0.147036*	*0.527466*	*0.130668*
Observations	44	44	44	36	36

In general, changes in export price levels were highly volatile and unpredictable. Price factors did in fact capture the consequences of financial crises by their downturns as expected theoretically. Constructed total-export-price index followed the weighted trends of price levels for export compositions and, thus, was adequately generalized.

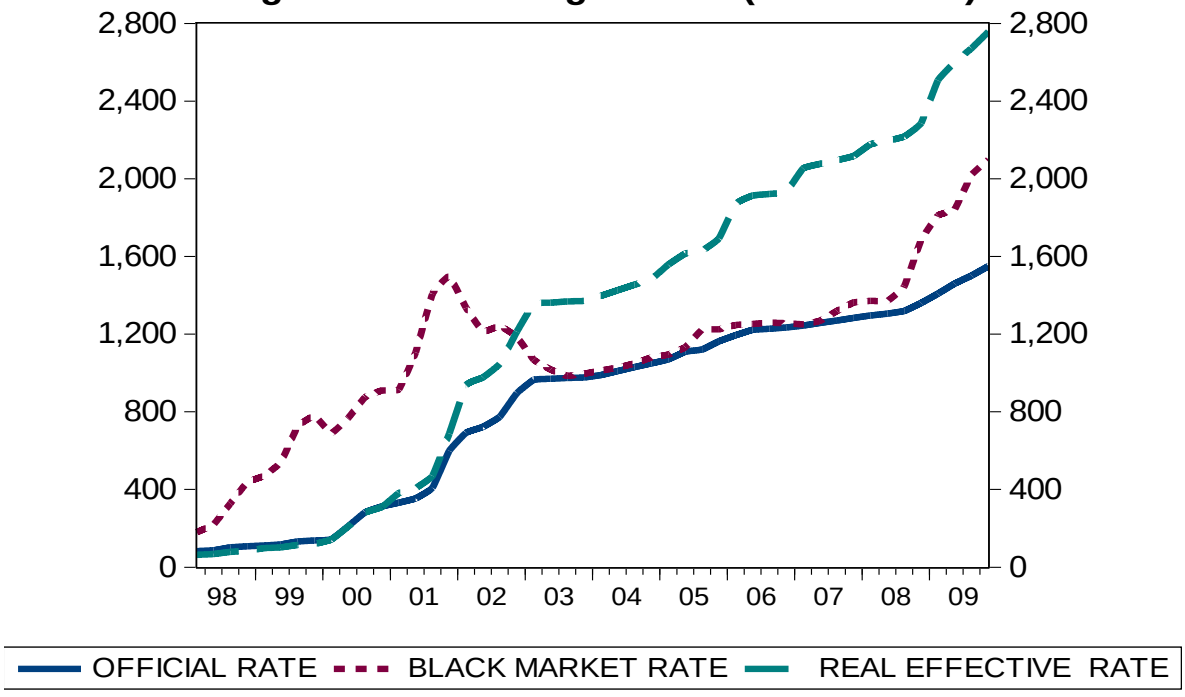
Above conclusive analysis on external export determinants were made regarding foreign income and price whose effects on exports of Uzbekistan the research proposed to test override those of internal factors. Project identified two internal export determinants: exchange rates and production dynamics.

Exchange Rates

Exchanges rates are directed to control current account balance as well as trade patterns of Uzbekistan. Depreciation of national currency makes the domestic products cheaper for foreign consumers and, thereof, exports increase other things stay unchanged. On the other hand, appreciation of national currency makes the domestically produced goods and services relatively expensive which, in turn, shrinks exports of the economy.

Figure 16 exhibits quarterly values on official, non-official (or black-market) and calculated real effective exchange rates (REER).

Figure 16. Exchange Rates (Sum/Dollar)



Note: All rates are in Sum/Dollar units that increase in those rates mean depreciation of Uzbekistan's currency.

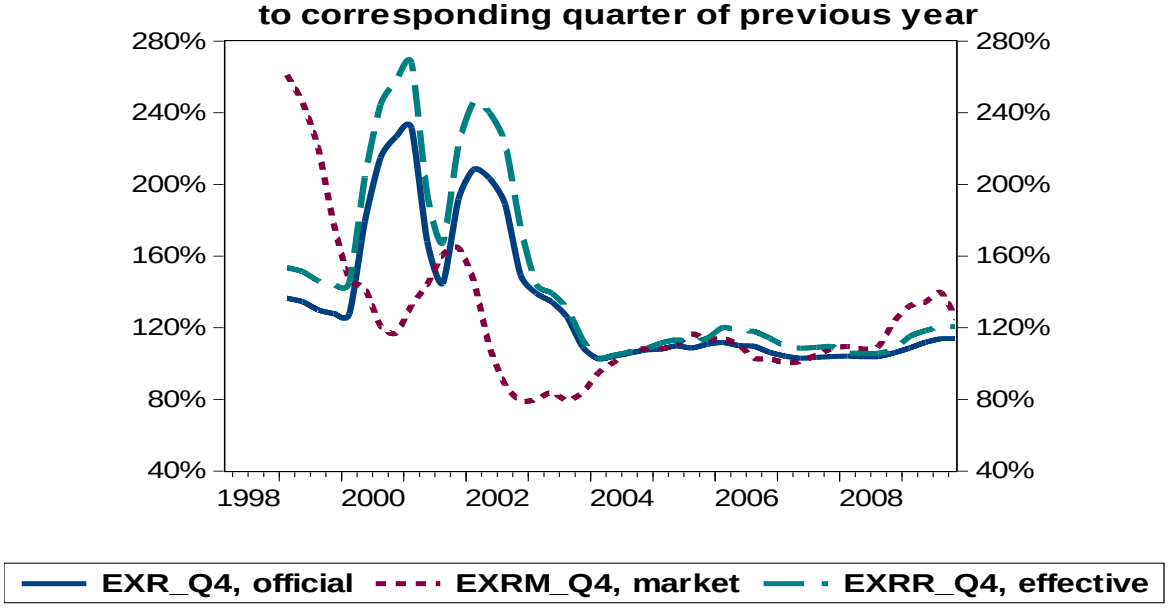
For 1998-2009, government has steadily depreciated its national currency officially quarter-by-quarter (Figure 16). The black market rate has increased significantly increased relative to the official rate until the beginning of 2002. The gap between official and unofficial rates reached highest 997.3 points in 2001Q3 which was more than 10 times greater than that in 1998Q1. Between the time intervals, official rates have been on average 3.7 times smaller than black market rates. Uzbek government's policy implementation on current account convertibility in 2003 stimulated trade and was successful in wiping-out the huge gap between official and nonofficial exchange rates. From 2003Q1 to 2007Q4 exchange rates increased from 965UZS/USD to 1285UZS/USD depreciating the national currency by about 33% without any gap between official and nonofficial rates. Coming to 2009Q4 officially 1USD was worth 1550UZS while it was equivalent to 2100UZS unofficially. Exports of Uzbekistan however depended not only on price levels in the country but also those in partner countries.

Real effective exchange rate (REER) takes this argument into account. Accordingly, until beginning of 2001 REER showed almost identical depreciation rates of sums against dollar which implies that price level movements[8] in Uzbekistan and its trading partners have been at the same rates. Until the introduction of current account convertibility, comparing to 2001 sum depreciated by 319% and 269% as of effective and official rates respectively. This means that price levels in Uzbekistan have significantly risen relative to price index of trading partners. Convertibility policy simply reduced the depreciation speed of REER but never reduced to the level of official or unofficial rates. As of the end of the analyzed period, REER was recorded as 2758UZS/USD that was 1208 and 658 points higher than official and black market rates.

[8]Price levels are measured by CPI indices. See methodology for calculation process of Real Effective Exchange Rates.

Corresponding changes in all three terms of exchange rates are shown in Figure 17. Changes were generated in yearly forms and 100% refers to zero change. Alternative exchange rate changes enter the export performance models by the notion of "best performer term". "Best performer term" technique provides estimation results using one representative of exchange rates (out of three alternatives) whose statistical econometric results are most sensible and satisfactory. For instance, exports of cotton which are done mainly through pre-signed contracts may be best explained by official exchange rates rather than unofficial ones. Using alternative results on exchange rates is expected to increase the accuracy, flexibility as well as statistical performance of export estimations further.

Figure 17. % change in exchange rates, to corresponding quarter of previous year



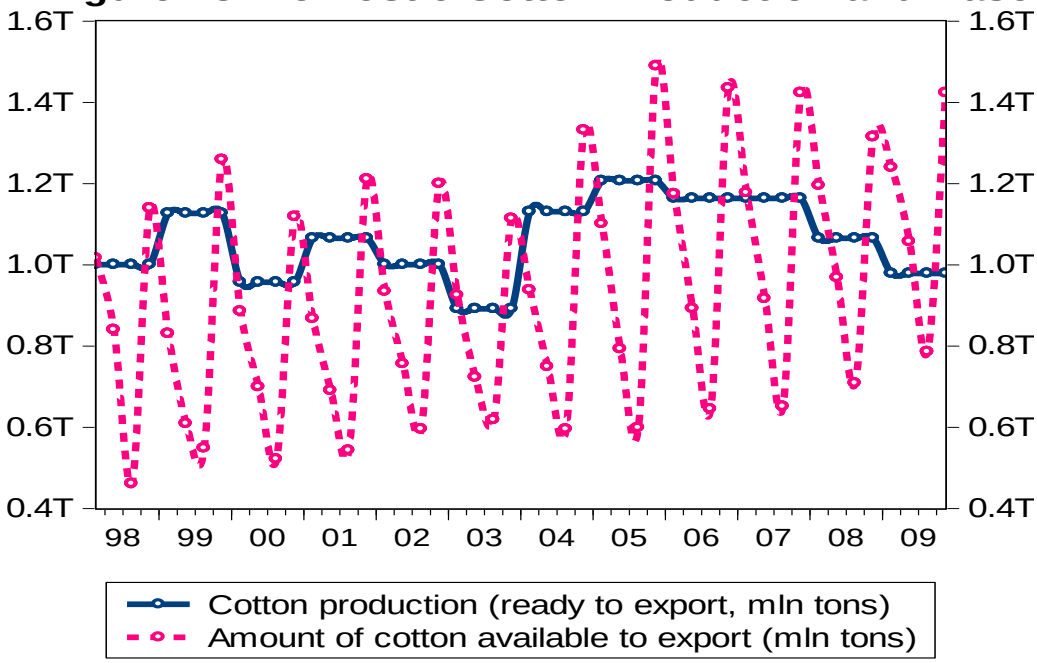
Annualized quarter-to-corresponding-quarter changes in the three types of exchange reflected following conclusions (Figure 17). National currency depreciated on average by 32.9%, 24.3% and 45.2% according to official, market and effective exchange rates annually. Official rates have demonstrated relatively tranquil changes, and REER was the most volatile rate mainly because of constantly changing price levels in countries. Convertibility policy of 2003 most affected market rates and caused annual decline of 20% in that year. From 2004 to the end of 2008, annual depreciation rates were similar for all three alternative rates. From 2009Q1 there were observed credible acceleration of depreciation of national currency in case of all three

exchange rates. This can be perceived as one of the anti-crisis policies of the Uzbek government targeting to stimulated exports.

Production of certain exported products

More production of export components domestically imply that there are more of the product and services that could be offered into world trade markets. Foreign demand on exports is, usually, met only after satisfying the domestic demand in Uzbekistan for the exported products and services. This holds true in the country as Uzbekistan where self-sufficiency is set as primitive step of economic development. Conclusions on production and domestic consumption determinants of cotton exports are made on the basis of Figures 18 and 19.

Figure 18. Domestic Cotton Production and Base

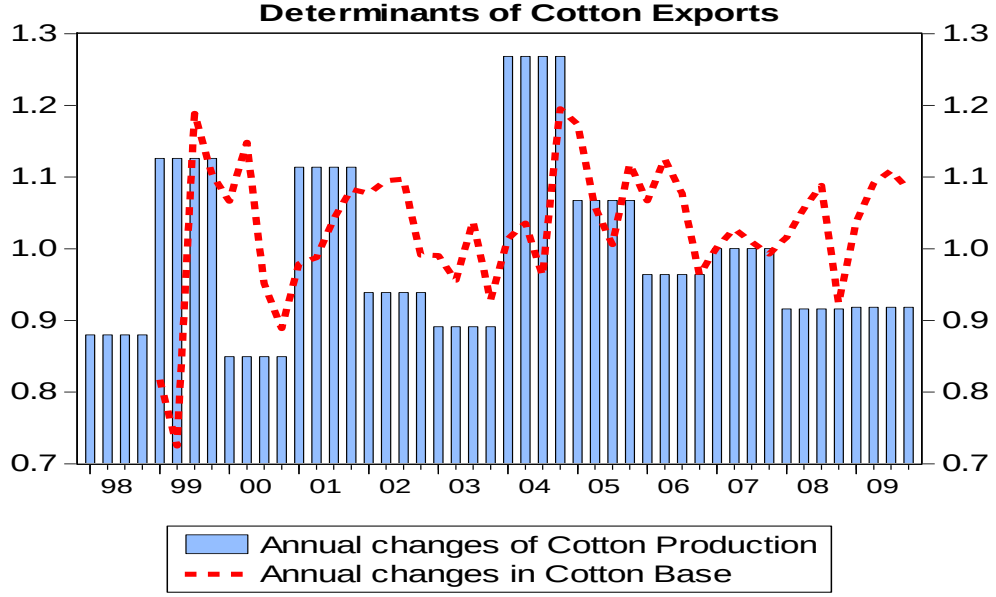


Note: Cotton production refers to amount of cotton that is ready to export without any need of reproduction. Amount of cotton available to export represents volume of cotton base available in Uzbekistan as of the beginning of each quarter.

On average, Uzbekistan produced 1.06 million tons of exportable cotton annually during 1998-2009. Highest and lowest cotton crops were recorded as 1.21 and 0.89 million tons in 2005

and 2003, respectively. Production increased by highest 26% in 2004. Regarding the cotton base, in the beginning of each quarter there was available, average, 0.93 million ton of cotton ready to be exported in bases. From 1998Q1 to 2009Q4 cotton base increased by, average, 3.1% in annual terms. This implies domestic consumption of cotton has decreased relative to its production.

Figure 19. Annual Changes in Production and Base Determinants of Cotton Exports



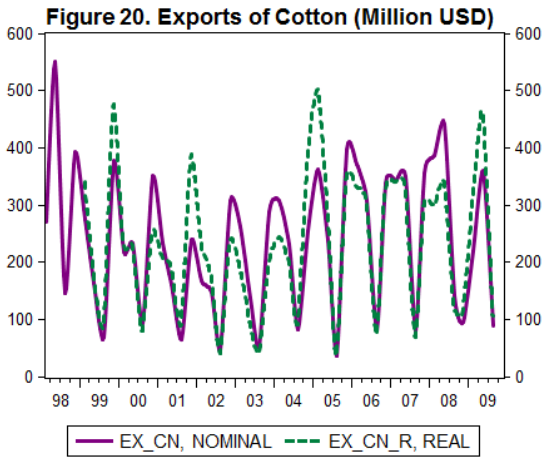
Note: Cotton base is taken as opposite alternative to the factor of cotton's domestic consumption.

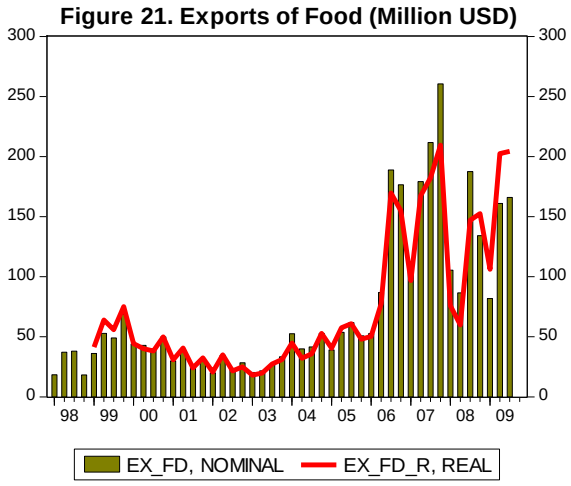
Because increase in domestic consumption automatically decreases cotton base available for exports. Both factors are in million ton units. Annualized quarter to quarter changes in cotton production and base determinants are shown by the next diagram. Note that 0.8 represents 20% annual decrease and 1.2 represents 20% annual increase in the export determinants.

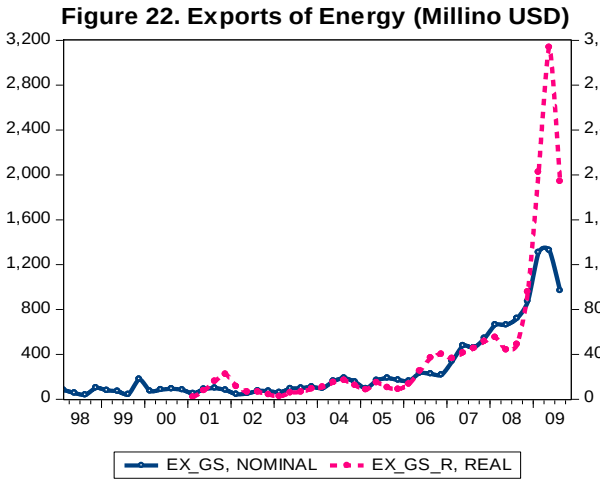
Ch 4. 3. Results of Econometric Analyses on Variables

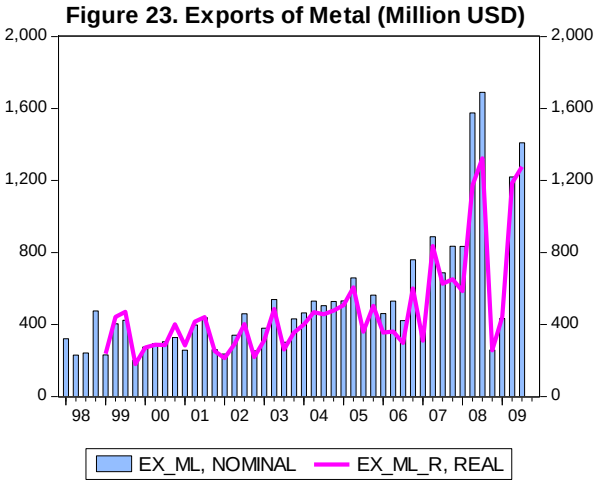
In order to prevent spurious models and estimate true relationships between dependant variables and price indicators, export components were transformed into real terms using their respective deflators. Deflators were generated in annual-chain-based-terms. Comparisons on

nominal and real export volumes are made on base of Figures 20 (cotton), 21 (food), 22 (energy) and 23 (metal and other products). Furthermore, annual changes in exports of the above four components were calculated and seasonal adjustments were made using the deflated real values.









The nominal values of export and export compositions were transformed in order to identify the net effects of exports prices changes within export performance models. Note that in the second half of 1999 and beginning of 2009, real volumes of exports of cotton, gas and food items exceeded their nominal values during the two financial crisis periods (Figures 20, 21, 22). As concluded above, during the same crisis periods price levels for these three product compositions declined significantly. These facts imply that nominal values of exports were mainly maintained by increasing the real volumes of export components. In other words,

Uzbekistan increased the real volumes of exports at diminished prices in order to preserve high export rates and recover foreign trade activities from consequences of crises. In fact, this is obvious in case of exports of energy. In the end of 2008 and beginning of 2009, 2000-3200 million units of energy were sold to other countries which made up only 925-1330 million dollars in nominal terms. Uzbekistan has tried to maintain steady rates of cotton exports.

Comparing Figure 11 and Figure 20 clarifies that when international cotton prices declined significantly during 2001 and 2004 real amounts of cotton exports were increased significantly. Similar but opposite conclusions apply to the food price hikes and lower real food exports in 2005 and 2007 years. In case of nominal and real exports of metal, conclusive interpretations slightly change (Figure 23). Real metal volumes have been under nominal exports referring to that world prices for metals have constantly increased for 1998Q1-2009Q4 which perfectly agrees with the conclusions made above. Correspondingly, annual growth of real metal exports has demonstrated slower changing speeds than those of prices. Thus, transformations to real terms completely removed spurious correlation between nominal export values and world prices for exports of Uzbekistan.

Additionally, in order to prevent any further spurious relationships and biased estimations all export variables and export determinants were tested for stationarity conditions using Augmented Dickey-Fuller method. With comparison purposes variables were tested using their both original and fully transformed forms (Table 3). Nominal exports of cotton and world cotton prices demonstrated stationarity under 10% and 5% critical levels at intercept as well as trend conditions. Confidences on stationarity increased when real seasonally adjusted annual changes were tested. Similar conclusions are made for the case of metal, gas and food exports. Trend stationarity conditions were provided for annual changes of world prices of metal and food under 1% critical levels. Foreign income index outlaid stationary trend with 95% confidence. For the

real annual changes of total exports, exports of chemicals, and exports of services ADF hypothesis of having a unit root was rejected under 5%, 1% and 10% critical levels. Production determinants of cotton exports: cotton production and cotton base followed random walk with drift process. Thus their respective transformations became stationary at ADF regressions with intercept conditions. Only in cases of official and effective exchange rates as well as exports of machinery stationarity conditions were not met.

Table 3. Tests for Stationarity: Augmented Dickey-Fuller Test Results

Variables (in levels)	Abbreviations	Conditions (1%, 5% and 10% are critical confidence levels)		
		Intercept	Trend and Intercept	No Intercept and No Trend
Export of cotton	EX_CN	10%	10%	NO
Annual % changes of exports of cotton in real terms and seasonally adjusted	EX_CN_R_Q4_SA	5%	5%	NO
World price of cotton	PW_CN	5%	5%	NO
Annual % changes of world price of cotton	PW_CN_Q4	1%	1%	NO
Exports of energy	EX_GS	1%	1%	1%
Annual % changes of exports of energy in real terms and seasonally adjusted	EX_GS_R_Q4_SA	1%	1%	10%
World price of energy	PW_GS	5%	10%	NO
Annual % changes of world price of energy	PW_GS_Q4	1%	1%	10%
Export of metal	EX_ML	NO	1%	NO
Annual % changes of exports of metal in real terms and seasonally adjusted	EX_ML_R_Q4_SA	1%	1%	NO
World price of gold	PW_GD	NO	NO	NO
Annual % changes of world price of gold	PW_GD_Q4	5%	1%	NO
Exports of food	EX_FD	NO	NO	NO
Annual % changes of exports of food in real terms and seasonally adjusted	EX_FD_R_Q4_SA	5%	5%	NO
world price of food	PW_FD	NO	10%	NO
Annual % changes of world price of food	PW_FD_Q4	1%	1%	NO
Real income index growth of trading partners	GDP_PART	10%	5%	NO
Cotton production	XCN	NO	NO	NO
Annual % changes of cotton production in real terms and seasonally adjusted	XCN_Q4_SA	5%	10%	NO
World price of food	XXCN	NO	NO	NO
Annual % changes of world price of food	XXCN_Q4_SA	1%	1%	NO
Annual % changes of official exchange rate	EXR_Q4	NO	NO	NO
Annual % changes of market exchange rate	EXRM_Q4	1%	1%	NO

Annual % changes of real effective exchange rate	EXRR_Q4	NO	NO	NO
Total exports	EX	NO	5%	NO
Annual % changes of exports, seasonally adjusted	EX_Q4_SA	1%	1%	NO
Exports of chemicals	EX_CH	NO	1%	NO
Annual % changes of exports of chemicals, seasonally adjusted	EX_CH_Q4_SA	1%	1%	10%
World price ofmachinery	EX_MY	NO	NO	NO
Annual % changes of exports of machinery, seasonally adjusted	EX_MY_Q4_SA	NO	NO	NO
Export of services	EX_SR	NO	10%	NO
Annual % changes of exports of services, seasonally adjusted	EX_SR_Q4_SA	1%	5%	NO

The hull hypothesis under the ADF-Test: H_0: Variable has a unit root. 1%, 5% and 10% values represent the rejection of the null hypothesis on 99%, 95% and 10% confidence levels."NO" implies that variable is not stationary under the chosen critical levels.

In order to check whether there exist long run relationships between exports and predicted export determinants in case of Uzbekistan Augmented Engle-Granger Cointegration Test has been utilized. The results of the cointegration tests are presented in the following table 4:

Table 4. Augmented Engle-Granger Cointegration Test Results

Dependant and Independent variables	**Critical Levels**		
	1%	**5%**	**10%**
Exports of Cotton and Its Determinants			
EX_CN_R_Q4_SA PW_CN_Q4	√	-	-
EX_CN_R_Q4_SA GDP_PART	√	-	-
EX_CN_R_Q4_SA XCN_Q4_SA	-	√	-
EX_CN_R_Q4_SA XXCN_Q4_SA	√	-	-
EX_CN_R_Q4_SA EXRR	-	-	-
Exports of Food and Its Determinants			
EX_FD_R_Q4_SA PW_FD_Q4	√	-	-
EX_FD_R_Q4_SA GDP_PART	√	-	-
EX_FD_R_Q4_SA EXRR_Q4	√	-	-
Exports of Energy and Its Determinants			

EX_GS_R_Q4_SA PW_GS_Q4	√	-	-
EX_GS_R_Q4_SA GDP_PART	-	√	-
EX_GS_R_Q4_SA EXRR_Q4	-	-	-
Exports of Metal and Its Determinants			
EX_ML_R_Q4_SA PW_ML_Q4	-	-	√
EX_ML_R_Q4_SA GDP_PART	-	√	-
EX_ML_R_Q4_SA EXR_Q4	-	-	-
Exports and Its Determinants			
EX_Q4_SA PW_EX	-	-	√
EX_Q4_SA GDP_PART	√	-	-
EX_Q4_SA EXRR_Q4	-	-	√

Note:Description of abbreviations are the same as in table 3: EX – exports, CN – cotton, R – real terms, Q4 – annual % changes, SA – seasonally adjusted, PW – world price, GS – energy, ML – metal, GD – gold, FD – food, GDP_PART – real income index growth of trading partners, XCN – cotton production, XXCN – cotton base, EXR – official exchange rate, EXRM – market exchange rate, EXRR – real effective exchange rate, CH – chemicals, MY – machinery, SR – services. For example, ***EX_CN_R_Q4_SA*** *is read as "annual % changes of exports of cotton in real terms and seasonally adjusted".*

Note: Cointegration hypotheses are tested under 1%, 5% and 10% critical levels. Confirming 10% refers to the prediction that there exists long-term relationship between dependant and an independent variable.

Results showed that there existed strong long term correlation between export compositions (cotton, metal, energy and food) and their respective prices. In other words, in the long run prices were important factors determining the exports of the product groups. Cointegration analysis further showed that in the long run exports of cotton and food were more in correlation with income of trading partners of Uzbekistan comparing to exports of energy and metals. As with nonstationary exchange rates, AEGC tests did not return any statistically significant long term relationships between exports of cotton, metal as well as energy and any of

the measurement terms of UZS/USD exchange rates. Implying that changes in exchange rates did not explain annual changes of these export compositions in the long run. Cointegration coefficient was, however, significant between effective exchange rates and food exports of Uzbekistan. Production and base factors were, also, cointegrated at 5% and 1% critical levels with exports of cotton of the country. Long run changes in total exports were also explained by changes in its determinants with satisfactorily econometric properties.

Ch 4. 4. Estimation Results on Export Performance Models

Export Performance Model for Exports of Cotton

Estimation results on export performance model (EPM) regarding export flows of cotton in case of Uzbekistan are provided in Table 5 below. All estimations are made using OLS (Ordinary Least Squares) method. All variables represent annual percentage changes:

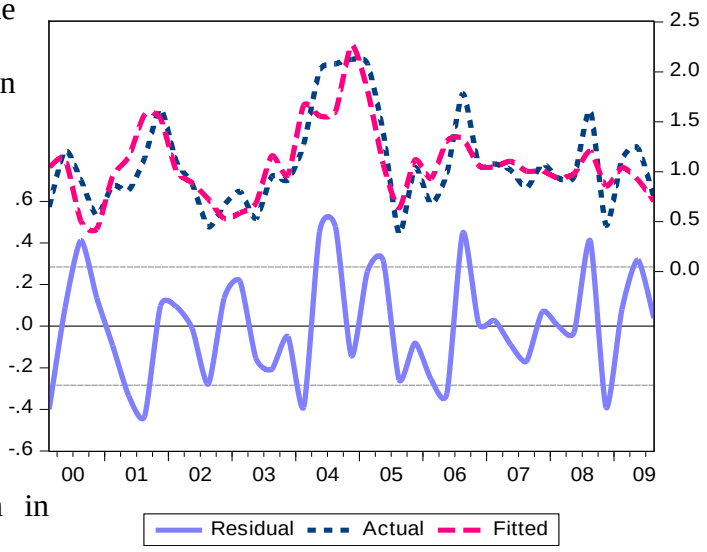
Table 5. EPM: COTTON. Dependant Variable: EX_CN_R_Q4_SA

Variable	Coefficient	t-Statistic	Prob.
PW_CN_Q4	-0.340572	-1.096267	0.2811
PW_CN_Q4(-3)	1.081856	3.974517	0.0004
GDP_PART	0.041421	2.117700	0.0421
EXR_Q4	0.029456	0.282493	0.7794
XXCN_Q4_SA	3.206430	3.646578	0.0009
XCN_Q4_SA	0.760144	1.523693	0.0743
C	-4.018954	-2.970965	0.0056
IncludedObservations	**R-squared**	**Adjusted R-squared**	**Durbin-Watsonstat**
39	0.681321	0.621569	1.964683

Estimated model explained the 68% of annual changes in the cotton exports (Table 5). There was no statistically significant relationship between current changes in cotton prices and those in cotton exports. Yet the relationship was highly significant for the lagged changes in prices. This is mainly because exports of cotton are made on contract-basis and/or being a raw agricultural product export supply decisions need certain amount of time to adjust to new price levels in world markets. Thus, one percent increase in cotton prices in the third lag increased the real cotton exports by 1.08%. Exports were relatively insensitive to changes in income of trading partners. 1% yearly increase in income index caused cotton exports to rise by average 0.041%.

The relationship was statistically significant at 5% level. Similar to the conclusions on cointegration analysis, exchange rates did not play any statistical role in determining changes in cotton exports of the country. Changes in the dependant variable were highly sensitive to change in the supply side determinants comparing to external factors. 1% rise in cotton base increased the exports of the product by 3.2% annually. Similar change in domestic cotton production caused 0.76% rise in the real volume of the export composition. The former internal factor statistically better explained the variability of cotton exports than the latter (t-stat were 3.64 and 1.52 respectively). This implies that importance of domestic consumption was higher rather than that of cotton production in export decisions of the country during 1998-2009. All above discussed statistically significant determinants of exports of cotton had expected economic signs.

Figure 24. How well estimated model explains Cotton Exports?



General performance of the estimated EPM in explaining changes in cotton exports can be analyzed by figure 24. The diagram provides actual and fitted values on annual changes of cotton exports.

Residual terms are also shown in order to observe visually whether estimations suffer from problems of serial correlations or not. Additionally, official test on autocorrelation among residuals of the regression has been done. Table 6 summarizes results of Breusch-Godfrey serial correlation LM test on EPM of Cotton. With quarterly data, four lags have been tested:

Table 6. Breusch-GodfreyLM Test: EPM-COTTON

Lags	Obs*R-Squared	Prob. Chi-Square	Serial Correlation	
			5% level	10% level

1	0.0086	0.9260	No	No
2	3.5676	0.1680	No	No
3	3.5677	0.3121	No	No
4	10.5205	0.0325	Yes	-

Even though the Durbin-Watson (DW) statistics is 1.96 which proposes high confidence on rejecting the phenomenon of autocorrelation, the residuals plot obviously followed a certain pattern (Figure 24). In order to check for autocorrelation, Breusch-Godfrey (BG) test was utilized and there existed serial correlation among residuals in the fourth lag (Table 6). This implies that residuals were not random and, as a result, estimated coefficients of export determinants incurred high standard errors and wide confidence intervals. In general, EPM well fits actual changes in cotton exports but high residuals during crisis and price shocks of 1998, 2004, 2006 and 2009 (Figure 24).

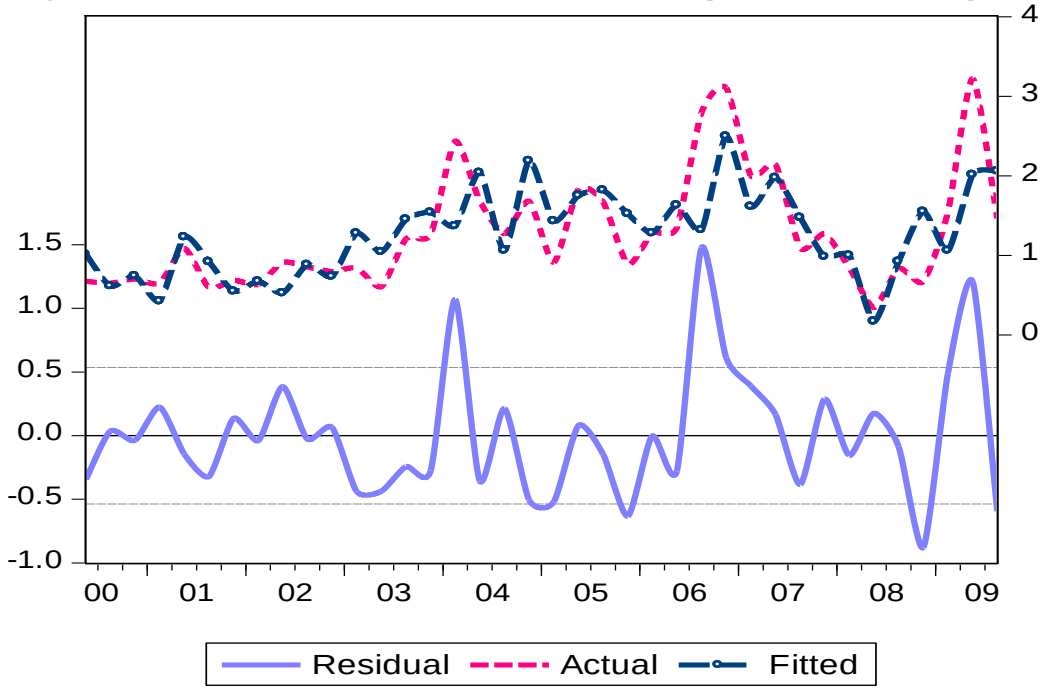
Export Performance Model for Exports of Food

Estimation of exports of food items is presented in table 7:

Table 7. EPM: FOOD. Dependant Variable: EX_FD_R_Q4_SA			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
PW_FD_Q4	**2.983742**	**2.698352**	**0.0110**
EXRR_Q4	**0.831900**	**3.298440**	**0.0024**
GDP_PART	**0.089997**	**1.948975**	**0.0601**
C	**5.209433**	**4.234989**	**0.0002**
AR(1)	**-0.333096**	**-1.741244**	**0.0912**
MA(1)	**0.947424**	**17.75852**	**0.0000**
IncludedObservations	**R-squared**	**Adjusted R-squared**	**Durbin-Watsonstat**
38	0.621678	0.511678	2.003495

Predictive ability of the export performance model in case of food exports can be seen from figure 25. Estimations included 38 observations starting from the year of 2000. Effects of lagged food exports on its current trends are captured by autoregressive process of first lag AR(1). First order moving average process MA(1) is also included in order to improve the econometric properties of estimated model by capturing effects of random shocks.

Figure 25. How well estimated model explains Food Exports?



Food exports of Uzbekistan were highly sensitive relative to their world price indices (Table 7). One percent annual increase in world prices resulted in 2.98% increase in the food exports, on average for each quarter. The second most influential determinant was real effective exchange rates. 1% annual depreciation of sums against dollar stimulated the food exports by 0.83%. Both relationships were statistically significant during the 1998Q1-2009Q2. Income of trading partners of Uzbekistan did also have statistically important impacts (at 10% level). With 1% real economic growth, trading partner countries consumed 0.089% more of food exports of Uzbekistan. Constant term in the estimated food EPM determines that, holding price, income and exchange rate determinants unchanged, exports of food annually increased by 5.2% from quarter to same quarter of previous year. Unlike cotton, lagged effects of food exports were significant at 10% level and negative as theoretically expected. If food exports were higher by 1% relative to its mean values in its first lag, current exports of food would decrease by -0.33%. In general, food export performance model underestimated the actual values especially during the crisis periods. Overall, model explained the 62% (or harshly 51%) of changes in country's food exports.

Table 8. Breusch-GodfreyLM Test: EPM-FOOD				
Lags	Obs*R-Squared	Prob. Chi-Square	Serial Correlation	
			5% level	10% level
1	0.297342	0.5856	No	No
2	0.369226	0.8314	No	No
3	3.803746	0.2835	No	No
4	4.207384	0.3787	No	No

DW statistics and residual plot as well as Breusch-Godfrey test results showed that regression analysis did not suffer from the problem of autocorrelation (Figure 25 and Table 8).

Export Performance Model for Exports of Metals

Table 9 provides regression results on exports of metal and other products.

Table 9. EPM: METAL. Dependant Variable: EX_ML_R_Q4_SA			
Variable	Coefficient	t-Statistic	Prob.
PW_GD_Q4	1.730960	2.331416	0.0258
GDP_PART	0.063480	2.577048	0.0145
EXR_Q4	0.108691	0.365162	0.7173
C	-0.713103	-0.423808	0.6744
IncludedObservations	R-squared	Adjusted R-squared	Durbin-Watsonstat
39	0.635975	0.611678	2.082200

Actual and predicted growth rates of exports of metals and other products are compared and contrasted in figure 26. The differences between predicted and actual values are represented by residuals. Serial correlation tests on the residuals are summarized in table 10 below.

Figure 26. How well estimated model explains Metal and Other Exports?

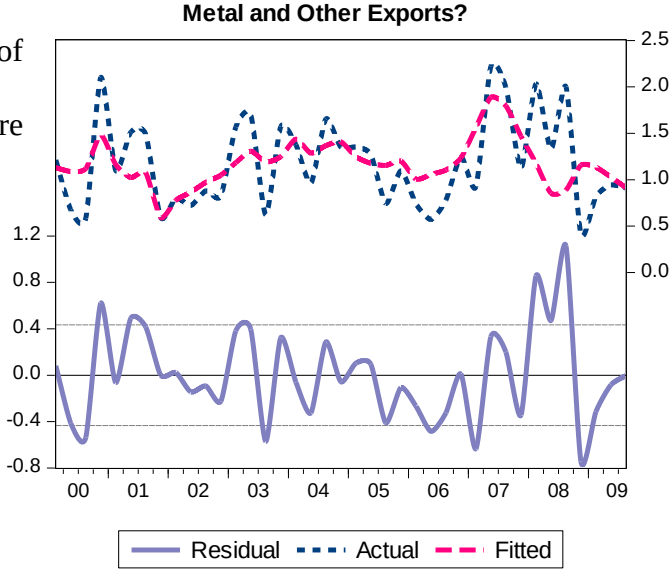


Table 10. Breusch-GodfreyLM Test: EPM-METAL				
Lags	**Obs*R-Squared**	**Prob. Chi-Square**	**Serial Correlation**	
			5% level	**10% level**
1	0.441257	0.5065	No	No
2	3.414539	0.1814	No	No
3	12.16431	0.1814	No	No
4	6.567408	0.1606	No	No

Regression results showed that the hypothesis of the project is not rejected in case of gold exports of Uzbekistan. External price and income factors mostly explained changes in the export trends (Table 9). One percent increase in world gold prices resulted in average 1.73% rise of metal exports. Elasticity of the exports was relatively low to changes in income of trading partners comparing to food exports. Unit percentage increase in real GDP growth of export-partner countries pulled up the exports of metal and other products by only 0.063%. Relationships of the exports with world price and income factors were statistically significant at 5% critical levels (with corresponding t-stats of 2.33 and 2.57).

Identified internal factor – exchange rates did not play any empirically significant role in explaining changes of metal exports of Uzbekistan. Overall, EPM for metal and other products captured 64% of changes in the export trends during the last ten years. Error terms of the estimated model followed purely random process, thus, no serial correlation was detected according to neither BG test results (Table 10) nor graphical analysis of residuals (Figure 26). Empirical performance of the model became poor only during the Asian financial crisis of 1998 and current economic slowdown starting from 2008 (Figure 26).

Export Performance Model for Energy Exports

Estimated parameters of export performance model for energy exports are presented in table 11:

Table 11. EPM: Energy. Dependant Variable: EX_GS_R_Q4_SA			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
PW_GS_Q4	**2.199953**	**4.374390**	**0.0002**
GDP_PART	**0.186749**	**2.501535**	**0.0193**
EXR_Q4	**-1.201937**	**-0.819407**	**0.4203**
C	**1.669890**	**0.800195**	**0.4311**
AR(1)	**-0.410695**	**-2.232921**	**0.0347**
IncludedObservations	**R-squared**	**Adjusted R-squared**	**Durbin-Watsonstat**
30	0.7213	0.67168	1.7942

Similar to other three most exported product groups, most influential external factor was price levels in case of energy exports of Uzbekistan. With one percent higher world gas price levels, real exports of energy became higher by average 2.2% annually. Relationship between world prices and energy exports of the country was highly statistically significant at 1% critical levels (Table 11 and cointegration analysis in Table 4). This means that gas prices performed well as a proxy of world energy price levels. Exports of energy, on average, rose by 0.19% when real economic growth of trading partners increased by 1%, in annual terms. Monetary policies regarding to the exchange rates were ineffective to control exports of energy for the analyzed period. Hence, effects of changes in UZS/USD exchange rates were negligible on the changes of energy supply by Uzbekistan into world markets. At 95% significance levels, if quarterly growth of exports of energy stood higher by 1% than its sample mean value in the previous quarter, exports in the current quarter on average decreased by -0.41%. Proposed research hypothesis is also supported in case of energy component of exports.

Figure 27 illustrates the fitted, actual and residuals of the regression on energy exports of Uzbekistan. Quarterly movements of residuals provide graphical motion of whether there exists correlation among them. Empirical tests on the issue are made using Breusch-Godfrey LM methodology. Results of the tests are provided in table 12 below.

Figure 27. How well estimated model explains Energy Exports?

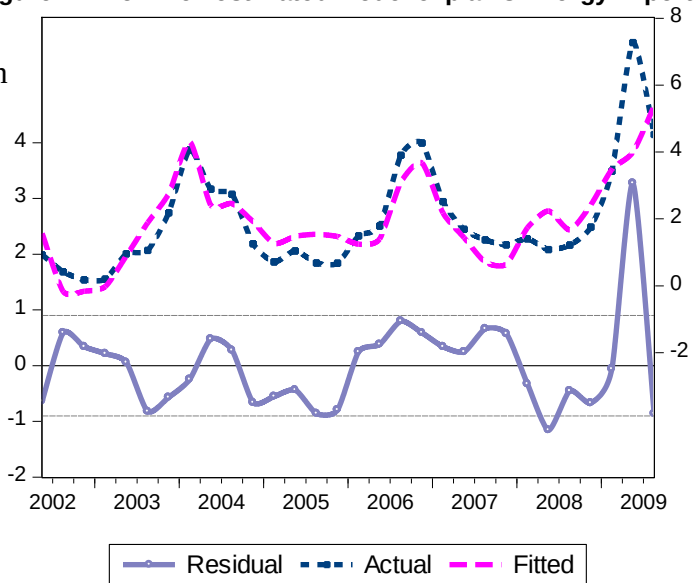


Table 12. BREUSCH-GODFREY TEST: EPM-ENERGY

Lag	Obs*R-Squared	Prob. Chi-Square	Serial Correlation	
			5% level	10% level
1	0.424857	0.5145	No	No
2	1.701495	0.4271	No	No
3	2.211228	0.5297	No	No
4	2.236135	0.6924	No	No

Energy EPM performed comparatively well in explaining changes in the dependant variable. In fact, 72% of changes in annual growth rates of energy exports were explained by the regression. Model mainly lost its accuracy when the everlasting financial crisis hit the world economy (Figure 27). No issues of serial correlation threatened the results of the estimations as concluded by the Breusch-Godfrey LM tests (Table 12).

Export Performance Model for Chemicals, Machinery and Services

Estimation results of export models for changes in exports of chemicals, machinery and services are summarized in table 13 below:

Table 13	*EX_CH_Q4_SA*	*EX_MY_Q4_SA*	*EX_SR_Q4_SA*
GDP_PART	(0.069615)**	(0.137687)*	(0.016890)***
EXR_Q4	(0.655951)* (MarketRate)	(0.046885) (MarketRate)	(0.105433)*** (REER)
C	(0.236496)	(0.619253)*	(0.927159)*
R2	(0.4780)	(0.659378)	(0.520087)
DW	(1,5704)**	(1.886547)*	(1.374986)

Note: *, **, *** refer to statistical significance at 1%, 5% and 10% levels. For Durbin-Watson statistics * and ** refer to no serial correlation for 5% and 10% critical levels respectively.

Empirical analysis show that exports of machinery have been highly sensitive to changes in income level changes in trading partners of Uzbekistan relative to those of chemicals and services. One percent annual real growth in income index pushed up the machinery exports by 0.14% while increases of chemical and service exports were 0.07% and 0.016% annually resulting from the same change (Table 13). Estimated coefficients for machinery, chemicals and services were statistically significant at 5%, 1% and 10% critical levels, respectively, corresponding to the conclusions on the cointegration analyses undertaken. Impact of changes in unofficial exchange rates on exports of chemicals was empirically noticeable. 1% depreciation of national currency along the market rate trend stimulated the exports of chemical product by 0.66%, in annual growth terms. Exports of services were best explained by real effective exchange rate changes: one percent annual increase of UZS/USD REER caused the exports of services to rise by 0.11%. Changes in exchange rates were irrelevant to the changes in exports of machinery. Ceteris paribus, exports of machinery and services, on average, grew by 0.62% and 0.93% annually.

Estimated export models explained the 48%, 66% and 52% of changes in annual growth rates of exports of chemicals, machinery and services, in that order. The former two models did

not incur autocorrelation problems, while EPM for services suffered from serial correlation associated with the residual terms of the regression.

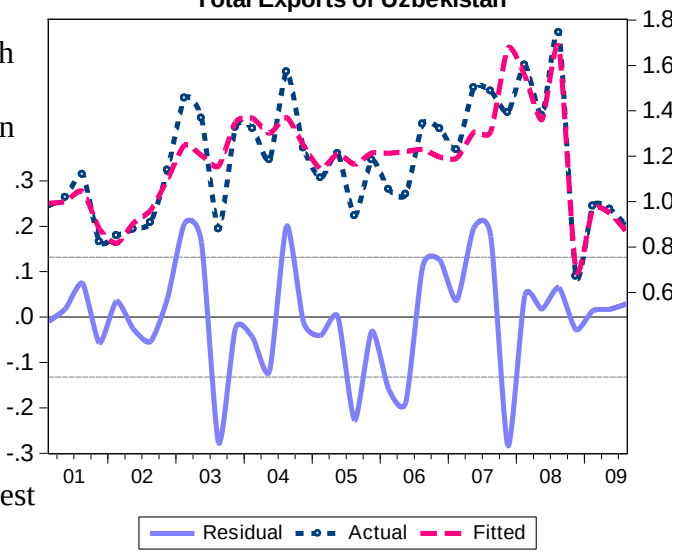
Export Performance Model for Total Exports

Finally, changes in total exports of Uzbekistan are regressed against generated exportprice index, index of trading partners' income as well as exchange rates. Results are presented in table 14.

Table 14. EPM: Total Exports. Dependant Variable: EX_Q4_SA			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
PW_EX_Q4	**0.433100**	**2.131677**	**0.0413**
GDP_PART	**0.020299**	**2.420374**	**0.0218**
EXRR_Q4	**0.130213**	**2.566867**	**0.0155**
C	**0.447222**	**2.401563**	**0.0227**
IncludedObservations	**R-squared**	**Adjusted R-squared**	**Durbin-Watsonstat**
35	0.765581	0.734325	2.012356

Performance of estimated total exports model is evaluated by actual vs. fitted graph illustrated in figure 28. Conclusions on autocorrelation are made on graphical analysis of residuals and DW statistics.

Figure 28. How well estimated EPM explains Total Exports of Uzbekistan



Impact of world price levels on total exports of Uzbekistan was highest comparing to income index and exchange rates. One percent increase in the export prices resulted in additional 0.43% increases in total exports. Similar change in the real economic growth of 23 trading partners caused annual growth of exports to rise by additional 0.02%, on average.

Overall changing trend of exports was best explained by the real effective exchange rate rather than official and unofficial rates. As calculated effective rates capture the price movements in both Uzbekistan and its trading partners, relative prices played important role for supply decisions of Uzbek exporters and demand decisions of partner countries. Annual unit percentage depreciation of national currency of the country by REER against the US dollars resulted in the stimulation of Uzbekistan's exports by 0.13%, in annual growth terms. Holding all discussed internal and external factors unchanged, growth rates of exports, on average, rose by 0.45% yearly. The estimated coefficients of the price, income and exchange rate factors were statistically significant at 5% critical level (with respective p-values of 0.04, 0.02 and 0.01). Accumulated changes in these factors captured the 77% of changes in annual growth rates of total exports for 1998Q1-2009Q4 period.

Calculated Durbin-Watson statistics of 2.01 and changing pattern of residual plot of the regression (Figure 28), showed that no autocorrelation threatened the regression results. Impacts of global financial crises have been almost perfectly represented by the total export performance model (Figure 28).

CONCLUSION

The research estimated the impacts of external and internal factors on changes in total and componential exports of Uzbekistan for the period of 1998-2009 using quarterly data.

The research developed a methodology for quantifying the impact of both external and internal factors on the both aggregate and key product exports of the country. Empirical specification of the model under the study revealed important information about the sensitivities of external trade variables to internal and external factors.

Conclusions showed that, in line with other emerging economies, foreign trade activity of Uzbekistan is mainly explained by external factors such as world price levels and income of trading partners. Impacts of internal supply-side factors such as exchange rates have been negligible. In fact, changes in the world price levels were the most influential factor in case of total exports as well as its key components: cotton, food, metals and energy. Even though, foreign income factor and exports of Uzbekistan had statistically significant cointegrated relationships, growth rates of exports and export components have been rather insensitive to income changes.

Changes in machinery and food exports have been most responsive to changes in income levels of trading partners. Internal monetary policies regarding foreign exchange rates have played little roles for the changes in exports of machinery, energy, metals and cotton. Overall, effect of real effective exchange rate on total exports was significant. In general, prices of cotton, food and energy have been subject to considerable fluctuations. Shocks resulted from two crisis periods in the beginning and end of 1998-2009 were the main sources of poor performance of estimated export models for four key export components. Generated export price and foreign income indices well represented the impacts of current global financial crisis within export performance models.

Finally, research did not reject the hypothesis that external factors predominantly explained changes in exports of Uzbekistan.

Following policy implications can be derived from the analysis and results obtained. Large scale liberalization policies of the government improved the export capacity of the country, thus, should be taken into account for further prospects.

The results also indicate of the volatility patterns of price level of export commodities. This volatility arises from the portfolio of export commodities held with our businesses and the government. Further diversification of this portfolio should reduce the volatilities and, added to that, cushion the impact of external shocks on the domestic economy. Diversification towards more finished and industrial products should also improve the competitiveness of the economy in the global markets.

Furthermore, the geographic diversification of the exports operations should be improved. The recent trends show that, the effects of the global financial crisis on countries and the pace of recovery from it are different. These differences reflect regional patterns which indicate of the strong contagion effects during recession and recovery of growth. For this reason, improving the geographic diversification of export and import operations should minimize the negative shocks arising from the changes in foreign demand.

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