Imported Goods' Demand Functions by the Main Areas of Use

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Abstract—**The article is devoted to the questions of the perfection of estimations of the connection between the demand on import goods, external and internal (includ-ing the government policy) factors. The authors highlighted the importance of taking into account the objective mechanisms of development of real demand for import by three main areas of use (intermediate consumption of economy, gross fixed capital formation and final consumption) in the context of generating the effective government rationalization policy of volumes and structure of import consumption in case of modernization of economy and the improvement of its competiveness. Taking into consideration the lack of publications with research in this area and the existence of some statistical limitations, authors make the aim of research the development of factor functions, explaining the indexes of volume of imported goods, formed into groups by the main functional purpose. The article provides the results of research devoted to estimation of the devel-opment of import demand in Russian economy in period from 2003 to 2015.**

Consolidated estimations of volume and medium price indexes of imported goods in case of the main directions of use, based on analytical processing of data by Federal Customs Service and Federal State Statistics Service are pre-sented. The main factors educed with the help of mathematical and statistical analysis of statistical time-series data, which determined the real dynamics of demand for import by three studied directions.

Also the article contains the raw of retrospective analysis results of import con-sumption. There are characteristics of specific weight of imported goods used in intermediate and final consumption, in gross fixed capital formation and shifts in distribution of imported goods by these directions in examined period. The conclusions describe the directions of practical use of the obtained results.

Keywords— Import, Demand, Function, Intermediate Consumption, Final Consumption, Gross Fixed Capital Formation.

I. INTRODUCTION

In the set of tasks for improvement the structure of Russian economy the important place takes the problem of import consumption volumes and structure rationaliza-tion. The main direction to solve this problem is the development and improvement of the production competitiveness. This requires the attraction of import of interme-diate and investment goods. Although sharp appreciation of imports and high credit interest rates limited the volumes of imports. To increase the effectiveness of gov-ernment policy in this area is required to perfect the tools accounting the connection between the parameters of government policy, the development of import demand from the main groups of customers and the production results of economy. The im-portant part of this tools are import demand functions.

II. ACTUALITY

Above mentioned determines the actuality of the theme of our research. The aim of our research was the developing the regression functions, explaining the real import dynamics by the main areas of use (by the functional purpose) for intermediate con-sumption, gross fixed capital formation and final consumption. This identifies the peculiarity of this research. Mostly in publications the indexes of volume of import goods are not studied in case of their functional purpose. However taking into con-sideration this aspect is important in developing the measures of government policy, influencing on the availability of imports for the main groups of consumers.

III. TASK DEFINITION

The aim of this research determines the following tasks.

The first task is the development of information rows with estimations of consoli-dated volume and medium prices indexes of imported goods in case of functional purpose using the data provided by Federal Customs Service and Federal State Statis-tics Service.

The second task is the research of motivations, determining the demand on inter-mediate import, import of customer goods and import of investment goods. Then the authors construct the primary set of indicators for including in factor import demand functions.

The third task is specification of factor import demand functions for examined types of consumption and the analysis of achieved results.

IV. INFORMATIONAL BACKGROUND

Informational background of the research was methodical materials and published by Federal State Statistics Service data (the data of system of national accounts, including «Input-Output» information, other information) [1], Federal Customs Ser-vice (import data in Commodity Nomenclature of foreign-economic activity (TN VED) groups) [2] and Central Bank (the exchange rate in period from 2003 to 2015) [3].

V. THEORETICAL PART

The theoretical background of the research was the guidelines of the international trade theory [4, 5], where price factors (relative prices) and incomes belong to the key motivations of import consumers. Also we used the results of the research of native [6-9] and foreign [10-18] scientists, where a lot of other factors of import demand for different concrete situations were found out.

In the research as the explaining variables were studied different sets of indicators, which characterize income, demand, supply of the production, prices directly or indirectly. Under otherwise equal conditions the preference comes to the sets, where repressors have obvious connection with economic government policy parameters. The following indicators come to the main set:

- indexes of average contract prices (USD) of imported goods type j - IP_{IMj}, where j identifies the area of use (for final consumption j=1, for intermediate consumption, j=2, for gross fixed capital formation j=3);

- average annual index of the exchange rate on the Russian market (RUB/USD) (Ik);

- average annual consumer price index for goods and services (INF);

- index of real disposable money income of the population (I_{RRDN});

- industrial production index (I_{PROM});

- index of real dynamics of investment in fixed assets (If_{IOK}).

In the process of research we got that it is appropriate to include in demand functions the parameter I_{KONj} , constructed from three price indicators from this list (1).

$$I_{KONj} = \frac{INF}{IP_{IMj} \times Ik} \qquad (1)$$

The denominator of formula (1) characterizes the dynamics of import prices in the ruble equivalent. Indicators I_{KONj} can be interpreted as indirect characteristics of the change in price competitiveness of imports in the domestic market of Russia. They explicitly contain two important control parameters (inflation and exchange rate). These parameters are included in the scenario conditions when making forecasts. The inflation rate under the terms of the Central Bank's targeting policy is adjustable. The dynamics of the exchange rate is estimated considering its relationship with export revenue and other factors.

The indicator I_{RRDN} characterizes the change in the real consumer purchasing power relative to the purchasing power of the previous period. It depends on the level of inflation and the dynamics of the consumers' income. The government policy exerts a significant influence on the dynamics of income. Wages in the budgetary sphere and monetary social transfers to the population form a large part of money income of population (in 2015 - at least 30% [1]). The tax policy and the interest policy of credit institutions influence on changes in disposable income. The interest policy, as the factor analysis shows, is closely connected with inflation (and with the policy of the Central Bank).

The indicator If_{IOK} characterizes the change in real demand for investment in fixed assets relative to the demand of the previous period. It is influenced by many factors (prices, revenues, interest rate policy, etc.). It is explicitly associated with the state investment policy (the share of budgetary sources in investments is about 20% of their total volume [1]). The budget investment estimations are a part of the scenario forecast conditions.

The indicator I_{PROM} characterizes the real dynamics of industrial production development. By the principle of construction, it is closer to the real dynamics of the GVA of industrial sectors. Although the volume indexes of the GVA sectors differ a little from the volume indexes of their intermediate consumption, we can consider the indicator I_{PROM} as a characteristic of the change in the real intermediate demand of industrial sectors relative to their demand for the previous period. The aggregate volume of intermediate imports of goods the share of goods entering the industry is high and very stable - 62-63% [1]. This allowed us to use I_{PROM} as explaining variable in the demand function for intermediate imports.

VI. EXPERIMENTAL RESULTS

To solve the first task of the study, analytically processed imports' data series of the Federal Customs Service for 2003-2015, generated in the Center of Macroeconomic Forecast of IMER with the authors' participation, were used [19]. Special software was used, it was developed taking into account the transfer keys between TN VED classifier and Classification of Products by Economic Activities (OKPD); distribution of

imports for functional purposes; the calculation formulas of price and volume indexes (Paasche and Laspeyres indexes, the criteria for cutting out the drop-out values). The consolidated results of the evaluation of the physical volume by func-tional purpose ( ) and average contract prices ( ) indexes are shown in Ta-ble 1.

Analysis of the "Input-Output" tables [1] showed the following [20]. During the es-timated period (2003-2015), by estimation in the basic current domestic prices the share of imports in the volume of goods consumed by households put down (from 37% to 27%), as well as for import goods to gross fixed capital formation (from 59% to 50%). The share of imports increased from 15% to 16% in the volume of goods used for intermediate consumption of the economy. Significant shifts occurred in the structure of the distribution of imported goods for functional purposes. In 2015 in the total volume of imported goods the share of intermediate imports was 47.2%, con-sumer imports - 30% and investment purposes imports - 22.8%. In 2013 these esti-mates were 41%, 41% and 18%, respectively.

TABLE I. CONSOLIDATED CHARACTERISTICS OF DYNAMICS AND AVERAGE CONTRACT PRICES OF IMPORTED GOODS BY THE PRIMARY AREAS OF USE FOR 2003-2015.

Type of imported goods	If_{IMj} over a period of			IP_{IMj} over a period of		
	2003-2015	2005-2015	2013-2015	2003-2015	2005-2015	2013-2015
All imported goods, which includes:	2,64	1,75	0,66	1,44	1,33	0,85
final consumption	2,71	1,68	0,63	1,43	1,30	0,84
intermediate consumption	2,53	1,74	0,73	1,48	1,37	0,84
gross fixed capital formation	2,81	1,89	0,54	1,36	1,30	0,90

TABLE II. ESTIMATES OF REGRESSIONS AND THEIR STATISTICAL CHARACTERISTICS (BASIC INDEXES, 2003-2015).

Type of imported goods	Import demand functions If_{IMj} and standard errors coefficients	R^2
Final consumption goods	$\ln(If_{IM1}) = 2.25 + 0.43 \times I_{RRDN} + 1.80 \times I_{KOM}$ s.e. $\quad$ (0.23) (0.09) $\quad\quad$ (0.23)	0,96
Intermediate goods	$\ln(If_{IM2}) = 2.96 + 2.29 \times I_{PROM} + 0.51 \times I_{KON2}$ s.e. $\quad\quad$ (0.27) (0.25) (0.24)	0,96
Gross fixed capital formation (finished product)	$\ln(If_{IM3}) = -1.69 + 0.59 \times If_{IOK} + 1.08 \times I_{KON3}$ s.e. $\quad\quad$ (0.6) (0.11) (0.27)	0,96

Using the determined variables, multifactor and single-factor regressions describing the dynamics of demand on import in the context of functional purpose were esti-mated. The functions (Table 2 and Table 3) are compiled using linked

indexes (year to year) and basic indexes (cumulative result by 2003). Their characteristics are also within tolerance.

TABLE III. ESTIMATES OF REGRESSIONS AND THEIR STATISTICAL CHARACTERISTICS (LINKED INDEXES, 2005-2015).

Type of imported goods	Import demand functions If_{IMj} and standard errors coefficients	R^2
Final consumption goods	$If_{IM1} = -2.26 + 1.20 \times I_{RRDN} + 2.08 \times I_{KOM}$ s.e. $\quad$ (0,38) (0,67) $\quad\quad$ (0,72)	0,90
Intermediate goods	$\ln(If_{IM2}) = 1.89 \times I_{PROM} + 0.85 \times I_{KON2}$ s.e. $\quad\quad$ (0,62) $\quad\quad$ (0,26)	0,95
Gross fixed capital formation (finished product)	$If_{IM3} = -1.89 + 1.91 \times If_{IOK} + 1.00 \times I_{KON3}$ s.e. $\quad$ (0,22) (0,33) $\quad\quad$ (0,29)	0,96

VII. CONCLUSIONS

The results of this study allow us to draw the following conclusions:

1. The part of imported goods in total volume of goods in comparable prices re-duced in the period from 2003 to 2015 significantly. The impressive influence on imports' volume reduction had its appreciation on domestic market, law income's dynamics and growth of the interest rates. According the formal criteria of reduction of the dependence of branches and investment sphere on imports doesn't allow speaking about its reduction with confidence. We can suggest that it occurs the trans-formation of imports' dependence in latent form. Conservation of the low import's availability of intermediate and investment goods can slow down the process of in-crease of Russian industrial competitiveness. It is important to take into account in the context of government economic policy.

2. In the research theoretical assumptions of the impact on import the financial prosperity of consumers and relative prices have been confirmed. This allows con-structing several factor import demand functions of different functional purpose. These functions can be used for generating approximate estimates of real dynamics of imported goods on mediate term with taking into account external and internal conditions of Russia's economic development. The set of explaining variables is con-structed in such way that it is possible to take into account some important parame-ters of expected government policy and Bank of Russia's policy.

3. Using the developed functions of import demand for three groups of consumers (their integration into macroeconomic tools, including cross-sectoral forecasting tools) will help to improve the consistency of forecasts for the development of industries and domestic final demand with the setting for fiscal, investment and monetary poli-cy.

4. The work on improving the tools for forecasting the imports' demand continues in the following directions:

- functions will be updated after processing the data for 2017 (the dynamics of imported goods sharply accelerated in 2017);

- the construction of demand functions is continued for intermediate imports in the context of individual type of goods, based on the Russian "Input-Output" tables (performance and expert) and FCS's statistics.

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