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 (including 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 competitiveness. 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 development 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 presented. 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 consumption. 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 rationalization. The main direction to solve this problem is the development and improvement of the production competitiveness. This requires the attraction of import of intermediate and investment goods. Although sharp appreciation of imports and high credit interest rates limited the volumes of imports. To increase the effectiveness of government 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 important 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 consumption, 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 consideration 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 Statistics Service.

The second task is the research of motivations, determining the demand on intermediate 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 Service (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 $j - IP_{i,j}$, 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 ($IP_{i,j}$).

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

$$I_{KON} = \frac{INF}{IP_{i,j} \times IK} \quad (1)$$

The denominator of formula (1) characterizes the dynamics of import prices in the ruble equivalent. Indicators $I_{KON}$ 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 $IP_{i,j}$ 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 Table 1.

Analysis of the "Input-Output" tables [1] showed the following [20]. During the estimated 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>
<thead>
<tr>
<th>Type of imported goods</th>
<th>$I_{IMj}$ over a period of</th>
<th>$I_{PMj}$ over a period of</th>
</tr>
</thead>
<tbody>
<tr>
<td>All imported goods, which includes:</td>
<td>2.64</td>
<td>1.75</td>
</tr>
<tr>
<td>final consumption</td>
<td>2.71</td>
<td>1.68</td>
</tr>
<tr>
<td>intermediate consumption</td>
<td>2.53</td>
<td>1.74</td>
</tr>
<tr>
<td>gross fixed capital formation</td>
<td>2.81</td>
<td>1.89</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Type of imported goods</th>
<th>Import demand functions $I_{IMj}$ and standard errors coefficients</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final consumption goods</td>
<td>ln($I_{IMj}$) = 2.25 + 0.43×$I_{PRD}$ + 1.80×$I_{KOM}$ s.e. (0.09)</td>
<td>0.96</td>
</tr>
<tr>
<td>Intermediate goods</td>
<td>ln($I_{IMj}$) = 2.96 + 2.29×$I_{PRM}$ + 0.51×$I_{KOM}$ s.e. (0.24)</td>
<td>0.96</td>
</tr>
<tr>
<td>Gross fixed capital formation (finished product)</td>
<td>ln($I_{IMj}$) = -1.69 + 0.59×$I_{FDK} + 1.08×I_{KOM}$ s.e. (0.11)</td>
<td>0.96</td>
</tr>
</tbody>
</table>

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).

<table>
<thead>
<tr>
<th>Type of imported goods</th>
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<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final consumption goods</td>
<td>$I_{IMj} = -2.26 + 1.20×I_{PRD} + 2.08×I_{KOM}$ s.e. (0.38) (0.67) (0.72)</td>
<td>0.90</td>
</tr>
<tr>
<td>Intermediate goods</td>
<td>ln($I_{IMj}$) = 1.89×$I_{PRM} + 0.85×I_{KOM}$ s.e. (0.62) (0.26)</td>
<td>0.95</td>
</tr>
<tr>
<td>Gross fixed capital formation (finished product)</td>
<td>$I_{IMj} = -1.89 + 1.91×I_{FDK} + 1.00×I_{KOM}$ s.e. (0.22) (0.33) (0.29)</td>
<td>0.96</td>
</tr>
</tbody>
</table>

**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 para-me-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.

References