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Interaction of the Home and the Economic Free Related

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Abstract

The article is devoted to solving the problems of internal economic relations in Ukraine in modern conditions in order to increase the efficiency of their functioning. Studied, systematized and generalized theoretical approaches regarding the features of the interaction of internal and external economic relations, which significantly complement the theory and methodology of the scientific principles of the branch economy. In Ukraine, during the period of restoration of trade and economic relations with the CIS countries and active integration processes in the world economy, the volumes and structure of exports and imports undergo significant changes. In this regard, it is advisable to forecast the export and import in the near future. Conceptual provisions regarding the formation of a national strategy, a mechanism for managing the development of Ukraine's integration processes on the principles of improving the current legislative and regulatory regulation in the country are proposed. In addition to the convenience for calculations, the hierarchical model also has other significant advantages. So, a high degree of independence of groups from each other makes it extremely flexible.

Keywords: Educational programs, personnel, planning, free related.

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Introduction

When predicting the development of foreign economic relations it is advisable to use the synthesis of intuitive and formalized methods. The methods of the non-formalized analysis and forecasting are based on expertise assessments. Their role in the final stage of evaluating possible options for the development of the foreign economic relations and choosing the most reliable version of the forecast is very essential.

Depending on the nature of the data available and the results required, the following expert assessment methods can be used: analytical method, commission siper strains, Delphi, Conferences. Their application involves the development of new ideas and approaches to solving problems in the formation of assumptions and hypotheses regarding the development of foreign economic relations. It should be noted that the mathematical description of the development of international economic relations is difficult.

Therotical Framework

This is due to the fact that these foreign economic relations is a complex system, the development of which is influenced by a huge number of interconnected factors of economic and socio-political nature:

- The amount and quality of the workforce;
- The availability of fuel and energy as well as raw materials, production capacities and investments;
- The scientific and technological potential;
- The structure of the national economic needs;
- The degree to which the country's division of labour has developed;
- The state of foreign trade markets;
- The level and proportions of world market prices;
- The supply and demand ratio in foreign markets.

Methodology

At the same time, methods based on economic and mathematical models and the use of computers are being used in many countries. Mathematical methods are most important when designing a version of the forecast.

Economic and mathematical models. Consider models that have been widely used in world practice to predict exports and imports: trend models; Export and import functions (multi-factor models); Comprehensive econometric models, Cross-industry balance models, Matrix models of international trade; optimization models. The trend models (y = a + вt etc.) extrapolate the past and current for the future. These models are used at the inertial forecasting stage. Extrapolation of the trend is often the only mathematical method of predicting foreign economic indicators. This may be due to two factors: ignorance of the nature of the cause and effect relationship between the predicted parameters and the factors that determine their dynamics, as well as the lack of information which is a basic to make a prediction of independent variables that predetermine the "behavior" of the indicator under study. It is possible to extrapolate the indicators only when there is confidence that the trend still exists in the future.

The method of extrapolation of the time series, which uses functional equations with one independent variable - t (time) is suitable for short- and medium-term forecasting of foreign trade parameters. This method is best at predicting aggregated indicators. Economists usually attribute the reliability of the forecast of enlarged indicators to the fact that the aggregate is aligning (mutual redemption of deviations) different trends that determine the overall dynamics of the indicator. In Ukraine, during the period of restoration of trade and economic ties with CIS countries and active integration processes in the world economy, the volumes and structure of exports and imports are undergoing significant changes. In this regard, it is advisable to carry out a forecast of exports and imports for the period up to one year. Such projections may be designed to promptly monitor the implementation of planned foreign policy decisions and their appropriate adjustments. The degree of accuracy of forward-looking calculations is significantly reduced.

Analysis

The consumer demand forecasting described in this article is part of building a large non-aggregate model, the Cambridge Growth Model. This model, developed over years by Professor Richard Stone and his colleagues at the University of Cambridge, contains approximately 1,000 equations and covers 35 industries and 40 types of goods. In such a system, accurate prior evolution of consumer demand is important. It may have the most direct impact on the structure of the economy and employment, but since the model is closed, these projections in turn, through income distribution and relative prices, have the opposite effect on the consumer demand. This monograph does not address this impact, but only the consumption sector itself. Specifically, we show how the total expenses of consumers the purchase of goods of short-term use are distributed among different articles of the consumer's budget. The total cost is defined as a function of disposable income. This definition is made using the model of the type described by Stone (Ponomarenko V.S. 2004)

The demand model which is basic in our developments is a linear cost system first applied in Stone's analysis of the data compiled in English almost twenty years ago. The basic equation can be written as follows:

$$p_i q_i = p_i c_i + b_i (\mu - \sum_R p_R c_R) + \upsilon_i ,$$

$$\sum b_i = 1 , \qquad (1)$$

Where υ_i — Stochastic member, pi— product price, qi— the amount of this product being purchased, μ — Total cash costs (for short-term income), bi, and ci;— Options parameters; Index i varies from 1 to n and means the number of items in question. This system has a simple interpretation: c, means the cost of necessary goods that are bought in the first place; the remaining income is spent on purchasing other goods in accordance with the parameters of bi. As soon as the value of variables is known, the linearity of the model in relation to prices and income makes it very convenient for calculations within the main model, and its compatibility with the theory of consumer demand guarantees the absenceof absurd or implausible forecasts 4.

However, in its basic form, the model is still not entirely satisfactory. The linearity of Engel's curves, which assumes that all the elasticity of demand from income tends to reach 1, is not supported by the data. The easiest way to take this point into account is to introduce linear time trends into the b coefficients. In this case the model is:

$$p_i q_i = p_i c_i + (b_i^0 + b_i^1 \theta)(\mu - \sum_R p_R c_R) + \upsilon_i ,$$

$$\sum b_i^0 = 1, \sum b_i^1 = 0, \qquad (2)$$

where θ —time.

Even so, achieving a satisfactory degree of convergence in a model of 40 types of goods is very problematic. The model is nonlinear for 120 parameters, not to mention 820 different elements of the covariate matrix of residual members (Pozdnyakova L.A. 2005). To avoid a dead end that could occur in case of necessity to solve problems on the basis of routine calculations, we have adopted a hierarchical procedure of evaluation and forecasting. Since this system can be derived from maximizing additively separate homogeneous utility function, it is known from Gorman 5 that the costs of product groups can be predicted on the basis of on total income and price indices by group and together with individual prices they are used to determine the cost of individual goods. If you label groups of goods in capital letters and if the item belongs to Group G, the equation (2) to determine the cost of the group, designated as p, can be written as follows: $\mu = \sum_{R_\varepsilon G} p_R c_R + (b_G^0$ (1)

$b_G^0 = \sum_G b_i^0$, $b_G^1 = \sum_G b_i^1$ и $\upsilon_G = \sum_G \upsilon_i$ (2)

It can be approximated as $\mu_G = \pi_G c_G + (b_G^0 + b_G^{1\theta})(\mu - \sum \pi_G c_G) + \upsilon_G,$ (3)

Where π_G — Group price index (Paashe index) determined by cost division at current and constant prices. So

$\pi_G^\theta = \sum_G p^\theta q^\theta / \sum_G p^\theta q^\theta,$ that is C $_G \approx \sum_G p^\theta c / \pi^\theta \approx \sum_G p^0 c$ (4)

Using this expression for group costs from the equation (3.1), we can now get the equation for a single product as:

Piqi=pici+($\beta_i^0 + \beta_i^{1\theta})(\mu_G - \sum_G p_R c_R) + \upsilon_i^*$:, (5)

However, if only b_G^1 is small by comparison with b^0_G', values β are set as $\beta_i^0 = b_i^0 / b_G^0; \beta_i^1 = b_i^0 / b_G^0 \{b_i^1 / b_i^0 - b_G^1 / b_G^0\}$.

Obviously, the values β_i^0 total 1, and values β_i^1 — Zero. The same is true for values

b_G^0 .и b_G^1 Consequently, the equations (3.2) and (5) are mathematically identical to the original equation (2) and can be evaluated in a similar way. Thus, you can deal with a large number of goods, evaluating only relatively small systems of equations. The range of goods and services which we use includes nine broad subgroups: foods, footwear and clothing, house, rent, lighting and heating, tobacco and alcohol, travel and communication, entertainment, other goods and other services. With the exception of the last two, each of these subgroups is disaggregated further – from two to 10 detailed product rows. What products and to which group to attribute them is determined on the basis of two criteria. Firstly, there must be an approximation that allows the equation (5) to take the same form as the equation (2). Therefore, groups should be selected in such a way that the time trends were as short as possible. At the same time, the total margin share of the budget should never approach zero, because otherwise the hierarchy of the process will be broken and the model can lead to absurd results. Secondly, if a hierarchical assessment leads only to a slight loss of maximum credibility, groups must be selected according to the structure of the covariconic matrix of stochastic deviations. In a model of linear cost system that excludes changeability and complementarity, any actual environments and relationships are presented as close relationships between deviations of individual equations. In the hierarchical model, such relationships with respect to goods belonging to different groups are ignored, and therefore classification should be made so that the goods that are in some particular way interconnected with each other, always found themselves in the same group. This criterion is usually easy to satisfy by grouping goods according to their broad purpose, such as food, clothing, etc., which is a usual is practice. Estimates of maximum plausibility for each subsystem can be described as follows. We consider a case where there are no time trends, because it is not of great importance. In the case of errors at each assessment level, it is assumed that only the ratios that occur simultaneously are not zero (Deyneka O.G.2012). For example:

$\xi(\upsilon_{it}, \upsilon_{ji}) = \delta_{tt'}\omega_{ij}$ for all t,t',i,j. (6)

Some difficulty lies in the fact that the matrix Ω (i,j- the element that is ωij) ss a special point. This follows from the fact that the right side of the equation (2) accurately corresponds to the income and thus:

$$\sum_j \omega_{ij} = \sum_j \xi(\upsilon_{it}\upsilon_{jt}) = \xi(\upsilon_{it}, \sum_j \upsilon_{jt}) = \xi(\upsilon_{it}, 0) = 0 \quad (7)$$

According to Barthen (Pasternak-Taranushchenko G. (2000)), you can get out of this position with a generalized reverse matrix Ω. Assuming the usual state, he showed that for n goods under T observations, maximum credibility is defined as:

$$L = n^{\frac{1}{2}T}\,(2\pi)_{-}^{\frac{1}{2}T(n-1)}\,(\det V)^{\frac{1}{2}T} \exp^{\{-\frac{1}{2}\}*\sum_t \upsilon V^{-1}\upsilon_t},$$

where V==$\Omega + \frac{1}{n} + tt'$, a t— a vector consisting of 1s. The next step is to take logarithms and maximize the logarithmic function of maximum plausibility in relation to elements Ω so that the condition of limiting community is met (Pasternak-Taranushchenko G. (2000)) This gives an estimate of maximum plausibility: $\widetilde{\Omega} = \frac{1}{T}\sum_t \widetilde{\upsilon}_t \widetilde{\upsilon}_t'$, (8)

where

$\widetilde{\upsilon}_t$ - estimated value υ_t corresponding to the specified size Ь and c, and the logarithmic function of maximum plausibility has the form of:

$$\log L^* = \tfrac{1}{2}T\{\log n - (-1)(1 + \log 2\pi)\} - \tfrac{1}{2}T \log\det \widetilde{V} \quad (9)$$

Because $\widetilde{\upsilon}_t$ is only a function of parameters Ь and c, the maximum plausibility estimates are determined directly by the maximization of this function:

$$\frac{d\log L^*}{db} = \sum_t (\mu_t - p_t^{'}c)\overline{V}^{-1}\{\widehat{p}_t q_t - \widehat{p}_t c - b(\mu_t - p_t'c)\} = 0 \quad (10)$$

$$\frac{d\log L^*}{dc} = \sum_t (\widehat{p}_t - p_t^{'}b')\overline{V}^{-1}\{\widehat{p}_t q_t - \widehat{p}_t c - b(\mu_t - p_t'c)\} = 0 \quad (11)$$

This system of equations is non-linear with respect to parameters and is solved by the Taylorian linearization of expression in brackets in terms δ Ь and δ c. Then, for any b and c data, a linear transformation can be calculated, possibly towards the maximum. In practice, the limitations of b and the tendency of the process to be non-existent should also be taken into account. As a rule, both the evaluation procedure and the hierarchical disaggregation of the system produced satisfactory results (Timofeeva T.O. (2006)). Aggregated product groups are described with a high degree of accuracy by general income and price indices; individual products can just as well be described by group costs and individual prices. This is true not only for consumer spending, but also for the physical volumes of purchases, the result of which is much more difficult to detect in the past. In addition to the conveniences for calculations, the hierarchical model has other essential advantages. Thus, the high degree of independence of groups from each other makes it extremely flexible. For example, at the preliminary calculations stage, the subgroup structure may change without recalculating the rest of the model, and when predicting, if there is no need to forecast all cost groups, there is no necessity to calculate all parts of the model. Naturally, this flexibility is achieved at the cost of the less accuracy of the system comparing all calculations being made simultaneously. In most cases, however, the practical accuracy of the calculations is sufficient. Moreover, it can even be said that the a priori the form of the error matrix should be fully limited to the interaction of the goods of the same group.

2. Model development

Alternative methods of calculations. Despite the great advantages of the hierarchy method, it is always useful to have an idea of other possible approaches, and we have had to explore a number of alternatives due to some difficulties that have been encountered. For example, using this method, an approximation that binds Co with the sum of individual c in the group, often turns out to be significantly less accurate than one would expect on the basis of on the colloquially of many prices. Experiments on the further aggregation of the main groups show that, at least in some cases, the amount received differs from the amount of private estimates more than would be desirable. Such difficulties indicate that the assumptions underlying aggregation are associated with certain inaccuracies. Thus, if the errors in model (2) were not related to the equations themselves, there would be no need to choose between the alternatives to aggregation. Since these inaccuracies may even outweigh the benefits of a hierarchical approach in other respects, it is advisable to consider ways to find the most plausible results in parallel. As a rule, for a system of this size it is irrational, but in this case there are two possibilities, depending on the specific structure of conditions10.

The first way is as follows. In the first condition (10.1) the matrix V-1 can be omitted because $(\mu_t - p_t' c)$ — Scalar; this leads to an equation that at any given value of c with is linear in relation to Ь, i.e.:

$$\tilde{b} = \left\{ \sum_t (\mu_t - p_t' c) p_t (q_t - c_t) \right\} / \sum_t (\mu_t - p_t' c)^2 .$$

Thus, the solution to the equation (11) can be framed put of ude Ь (10.2). Then, if time trends are used, maximization is carried out with a much smaller number of parameters (п instead of 3п). Although this method is more complicated algebraically, it allows to save calculation time. Re-inversion is possible for a matrix with a size of 40X40, but not for a matrix with a sizes of 120 X 120. In the near future, if a convergence program is developed, we hope to apply this method.

The second method is a type of Stone's initial iterative procedure. It is based on the fact that for conventional calculations based on the method of the smallest squares not only a linear calculation Ь, if you know is possible c, but vice versa. Note that this is not appropriate for evaluation based on the method of maximum plausibility, because in the condition (10.2) the matrix V has non-linear Ь and c. However, the expression (11) gives a linear assessment for Ь and, moreover, it is identical to the estimate based on the method of the smallest squares at a given c. This allows to make several assumptions.

For example, it is clear that any estimates based on the method of the smallest squares of values Ь and c satisfy the condition д log Ь*/дЬ = 0, but this in itself does not really matter, as the second condition (10.2) is not satisfied. However, Hessia's assessment of maximum plausibility shows that the second derivatives are much more important to the b than to the C. Thus, the function of maximum plausibility can be depicted as a dividing line going on parallel to directions with a sharply expressed peak in directions Ь. Therefore, any assessments that meet the condition 0\ogL*lob == 0, although not satisfying the functions of maximum plausibility, will have two important properties (it can be shown that the estimates Ь and c based on the function of maximum plausibility will not be asymptotically independent; if that were the case, then any agreed estimates c would give estimates Ь with all the asymptomatic characteristics of the assessment based on the function of maximum plausibility). The first of these properties is that the values Ь should be close to estimates based on the function of maximum plausibility, and the second is that the value of maximum plausibility should not deviate significantly from the real maximum. Then the next order of practical calculations is possible. First, find suitable estimates of values c (perhaps with the first few iterations of the method described above). Then directly from the equation (11) the values of Ь are calculated. Such an assessment may in many cases be satisfactory and, in any case, it is easy to calculate. Note, however, that further iterations Ь and c Stone's method will not probably produce productive results, since estimates c according to y & according to its formula, based on the method of the smallest squares, although reducing the residual amount of squares, will not necessarily increase the maximum plausibility.

Alternative demand models. Much work has already been done in this area to make firmer conclusions than the above.7 This work was based on the nine aggregated groups of goods and services we described for the period 2009-2019.

A number of demand models have been studied- in addition to the linear cost model, several variants of the Tail-Barthena8 Rotterdam Model, the direct additive model9 and the model that excluded the substitution effect as a result of the price change, determining changes in consumer spending only by changes in real incomes. Each model was reduced to a common algebraic expression and general probabilistic specifications based on the function of maximum plausibility. They were then compared according to the maximum plausibility estimates. At the same time, it turned out that the linear cost system yields worse results than its nearest rival - direct additive model. This may be due to the overly stringent requirements of Engel's curves - no study has been carried out from this point in view. In any case, this can be corrected by the introduction of time trends in the model of the time trends we have already described. It is more important, probably, that price movement modeling based on the additive utility function does not correspond to the actual processes (Novikova AM (2003)). The reason for this circumstance is that for additive processes is following is true:

$$Sij \propto \frac{dq_i}{d\mu} * \frac{dq_i}{d\mu}, (i \neq j$$

Where Sij— compensated derivative qi by pj. This completely excludes a certain kind of relationship between goods (e.g., complementarity or close interchangeability).

Discussion

The objective conditions currently prevailing in all sectors of the national economy of Ukraine are clearly negative. Economic development is in a state of crisis, leading to a decline in production. Therefore, the urgent task is the problem of making decisions that would contribute to the suspension of the decline in production at the first stage, and at the second stage, its stabilization at the macro, meso and micro levels in the conditions of limited and deficient production resources.

The statement of the problem, therefore, involves the study of the state and internal economic relations, the determination of their socio-economic significance for the development of the Ukrainian economy as a whole, as well as the establishment of the direction and level of development for the future.

It has been proven that the expression (12) turns out to be generally incorrect even for aggregated product groups. Therefore, an important subject of follow-up research should be the modification of the system that would allow for greater interchangeability of goods. However, even the inning of such possibilities goes far beyond the scope of this scientific study. We have considered only the initial stage of analysis, the results of which prove the need for such modification

Conclusion

Thus, the article is devoted to the formation of a decision-making concept on the direction, level and choice of the best option for the socio-economic development of the wind farm based on the development of methods for determining and predicting socio-economic indicators. The article develops a new direction in socio-economic modeling, based on the concept of economic development of Ukraine. It is established that the developed model consists of a stage of socio-economic development, which includes a development process or a forecasting process. A set of methodological recommendations is presented for choosing a variant of social procedures when deciding the interchangeability of goods. The model is justified theoretically and practically confirmed. The presented methodological recommendations are based on a practical study.

Conflict of interest

The authors declare no potential conflict of interest regarding the publication of this work. In addition, the ethical issues including plagiarism, informed consent, misconduct, data fabrication and, or falsification, double publication and, or submission, and redundancy have been completely witnessed by the authors.

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