Estimating imperfect competition impact on producer prices in Russia in 2003-2010

Topic: Examinations of Input-Output Price Model
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Monetary instruments don't give sufficient and stable results in decreasing inflation in Russia. That's why it is proposed that one of the reasons is a significant number of monopolistic and oligopolistic markets in Russian economy. Companies on such markets have the power to increase prices and transfer the increase of their costs to consumers. Price shock on one of the markets could result in growth of prices in a whole economy.

Its' well known that imperfect competition can have impact on prices. Aim of this article is to estimate such effects quantitavely. First of all, significance of such effect is tested. For this industry price changes and cost increase are compared. Numbers of costs increase are got with help of IO tables. By preliminary estimations, results are significant for years 2009 and 2010, and are not significant for previous years.

Introduction

Inflation is one of the most pressing and urgent problems in the Russian economy. Reducing inflation to 3-5% per annum is declared over the past 10 years, but this goal had not yet been achieve. Since the growth rate of consumer prices for 2009 and 2010 make up 8.7%.

The main negative effects of inflation are a depreciation of cash on hand and the decline in real living standards, with persistent or growing slower wage. To a large extent it affects the least socially protected people who have no opportunity to keep their savings or standard of living against inflation. Thus, inflation is one of the ways to increase social inequality.

If we formulate the problem more precisely, the issue is rather source of inflation than its rates. State institution responsible for inflation control- is the Central Bank of Russian Federation. It is declared that there are instruments to control the price level in the hand of the Central Bank authorities. Such are interest rates, open market operations and changes in reserve requirements for commercial banks. Another tool to influence the money supply is purchase or sale of foreign currency. In view of the trade surplus in Russia, as a rule, the Central Bank is forced to buy foreign currency thereby increase the ruble money supply.

There are in conflict two goals of the Central Bank - to prevent excessive strengthening of the ruble and at the same time, reduce or prevent the increase of inflation rate. In the case of strengthening of the ruble exchange rate commodity exports will be only profitable ones, the production of industrial products will be virtually no competitive compared to imported products. In this case the flow of export revenue depends on world prices for commodities that are not in any way controlled by the Central Bank. That's why Central Bank officials say that inflation targeting and floating exchange rate is possible only after changing the structure of the Russian economy and reducing dependence on world commodity prices.

Due to the limited capacity of the Central Bank's monetary tools are available which control changes in price levels, there is interest in the non-monetary factors of inflation. Such factors may include differences in price levels in domestic and foreign markets, which cause a leveling of prices,

the impact of limited competition in some industries, changes associated with structural changes in the Russian economy, and so on.

Literature overview

There is small number of papers directly related to the inclusion of imperfect competition in the Leontief price model. Usually, imperfect competition is modeled in a general equilibrium model, which may include input-output block.

In Roson [2] the technical aspects and the impact on the calculations of imperfect competition in general equilibrium models, rather CGE is studied (Computable General Equilibrium models). The article examines the impact of the choice of interaction models on the market (monopoly or oligopoly is one of the models) on the final results. It also indicates that for the calculation with the inclusion of imperfect competition is necessary to use additional parameters, which are not always known. The use of expert judgment in this case makes a certain distortion in the model. Imperfect competition is introduced into the model through a mark-up, that is in excess of price over marginal cost. These two quantities are linked through the elasticity of demand. It is shown that the incorporation of imperfect competition affects the behavior of prices in the model only in the case of variable mark-ups over marginal costs. Otherwise, the mark-up is just another element of fixed costs and passes the full price shocks

In Basu [1] the business cycles in models with intermediate consumption of resources and imperfect competition studied. In the model with imperfect competition and the availability of intermediate consumption is modeled by the change in the release of the business cycle. It also indicates the relationship between the presence of intermediate consumption, and price rigidity. She explained that being in the production chains, individual producer can change prices only after their suppliers, competitors and customers. Otherwise he loses either profit or market share.

In constructing such models take into account several things.

First, using the production function characterized by constant or increasing returns to scale. If there is no increasing returns to scale, then

there is no economic benefit to enterprises become stronger and take significant market share. In models of the same issue of the cost of production functions , production is characterized by constant returns to scale.

In the modeling of imperfect competition, it is important to know the elasticity of demand for products industries, as the evaluation of these parameters depend on the calculations of the entire model. State Statistical Committee provides only an estimate of the concentration ratios by industry. Not all industries that present in IO tables are included.

Model

This model has a number of assumptions that have a direct impact on the result. What should we look for.

First, each branch of the price increases as much as its costs rise. Leontief price model assumes perfect competition market. All industries are price takers, rather than defining it. If at least one branch of the company had market power, they would have transferred their customers not only increase costs, but also a part of their profits, that is not given to its decline in percentage terms. Or even try to enlarge it.

Second, the technology of production remains unchanged. No changes in market prices of resources and products can cause changes in the industries technology. That is correct to use the Leontief model for short-term forecasting. Given rapid changes in Russia's economic structure it's hard to take into account this assumption. To some extent, changes in technology are displayed when updating the system input-output tables, but the last table left in 2006 and reflect the information for 2003. The following tables will be released no earlier than 2014, therefore, to investigate changes in technologies based on the cost of production of the tables before this time will not work.

Thirdly, it is assumed that there are no restrictions on the required resources. That is, if necessary it is possible to increase the production assuming all necessary resources are available in unlimited quantities and prices can be changed. If there is any limitation in resources, the price for them will increase, causing changes in production technology. That is, once

again shows that the model is more suitable for short and medium-term model, or we must use the input-output table for several time intervals.

Fourth, the model does not reveal the time at which the change in prices is needed. Original or cumulative effects are estimated. To determine the time over which price changes are implemented, model requires a separate study.

Fifth, we do not take into account the effects of supply and demand. If the prices of products of different industries are changed than demanded quantity for them is varied. It may be a replacement product or a branch may not have sufficient funds to purchase resources in sufficient quantity for further production. For example, this situation is possible if the industry - the provider of resources, limited competition, and vice versa products sold in the market of perfect competition. In this situation, the industry is not possible to pass the increased costs in full to consumers, which will inevitably lead to lower profit margins in the industry.

Among all the above factors, imperfect competition was chosen to further develop the model. Why the factor of imperfect competition may be so important for Russia?

First, in many sectors of Russian economy, the major share of the market's is held by 3-10 largest companies. There are 8 vertically-integrated oil companies on the oil market. In the gas market's biggest earner is the state owned Gazprom, which besides has monopoly on the export of natural gas. In the steel industry there is Severstal, Mechel, NLMK, Evraz, etc. In many ways, this is due to the structure of all the Soviet planned economy, which is characterized by the construction of giant factories, which were centrally managed from a single industry-wide ministry.

Second, natural monopolies are important in the economy. For example, electricity transmission services, railways, oil and gas transportation through pipelines. Some of them are in the process of reform, but the results are either not yet been achieved, or is no longer evident. Thus, monopoly on the infrastructure and locomotive traction is maintained in the railway transport. Reform of the electricity industry has led to the formation of several major energy holdings. The Gazprom monopoly is firm

Third, there is a problem of monopoly in the regional markets. So in each regions the wholesale gazoline markets usually is dominated by one or several of the largest vertically integrated oil companies. Production of constructing materials in the regional markets is also monopolized or oligopolistic.

In such circumstances, the assumption of perfect markets in Leontief price model is not satisfied and some adjustments need to be made.

Given the rigidity of the prerequisites for the Leontief price model, it is could be modified according to the degree of concentration of production. Purpose of this paper is rather test the significance of imperfect competition factor. Model extension would be proposed in further papers.

The model to test the significance is based on the following assumptions. In the basic Leontief model price impulses are transmitted by 100%. If companies have monopoly power, they can fully pass on the increase in their costs to consumers. That is, industries with a high degree of market power transfer price momentum to a large extent. If the industry is characterized by a high level of competition, the company in it can't fully pass on their increased costs to consumers of its products. Therefore, manufacturers are forced either to reduce profitability, or to reduce production. Only a decline in production may cause an increase in product prices in the industry. If the rates in the industry regulated by the state, the prices for the products of the industry did not change after the increase in costs. This process usually occurs only once a year.

Let formalize the proposed assumptions. Let c_i – is the concentration ratio in the industry i, and $\lambda(c_i)$ – characterizes the degree of increase in prices for the products of the industry following the increase in costs. For industries with a high level of market power $\lambda(c_i)$ tends to 1, in the case of a low level of market power and a high level of competition $\lambda(c_i)$ tends to 0. There is a problem of estimating the functional dependence $\lambda(c_i)$. This can be done as follows.

Let in year $t-1$ τ_i is the increase of costs in the industry i. Then, taking into account the degree of market power, prices for the products of the industry i to grow by $\lambda(c_i)* \tau_i$. This value can be compared with the actual increase in prices for the products of the industry i in the year t p_{it}. we obtain the equation

$$p_{it} = \lambda(c_i) * \tau_i \qquad (1)$$

Dividing both sides by τ_i we get

$$\frac{p_{it}}{\tau_i} = \lambda(c_i) \qquad (2)$$

In this equation, we know the rate of growth of prices for the products of the industry p_{it}, concentration ratios c_i. To assess the growth of costs in the industry can be based on the matrix of technological coefficients, adjusted for price increases. τ_i will be calculated as the increase in material costs. then

$$\tau_i = \sum_{j=1}^{n} a_{ij}(t) / \sum_{j=1}^{n} a_{ij}(t-1) \qquad (3)$$

Thus, there are arguments to the function c_i and the values of the function, $\dfrac{p_{it}}{\tau_i}$. Based on these data it is possible to build a cloud scattering and to estimate the functional dependence *ln(λ(ci))*.

Estimates

Regressions were estimated for the period from 2003 to 2010. As a result, the hypothesis of an association between the change in industrial prices and the level of concentration in industries has been rejected for the years excluding 2009, 2010. Also, the hypothesis is not rejected in the calculation for the entire period 2003-2010

ln(?i(ci)) 2010

y = 0,0111x + 0,0176
R?= 0,5735

ci
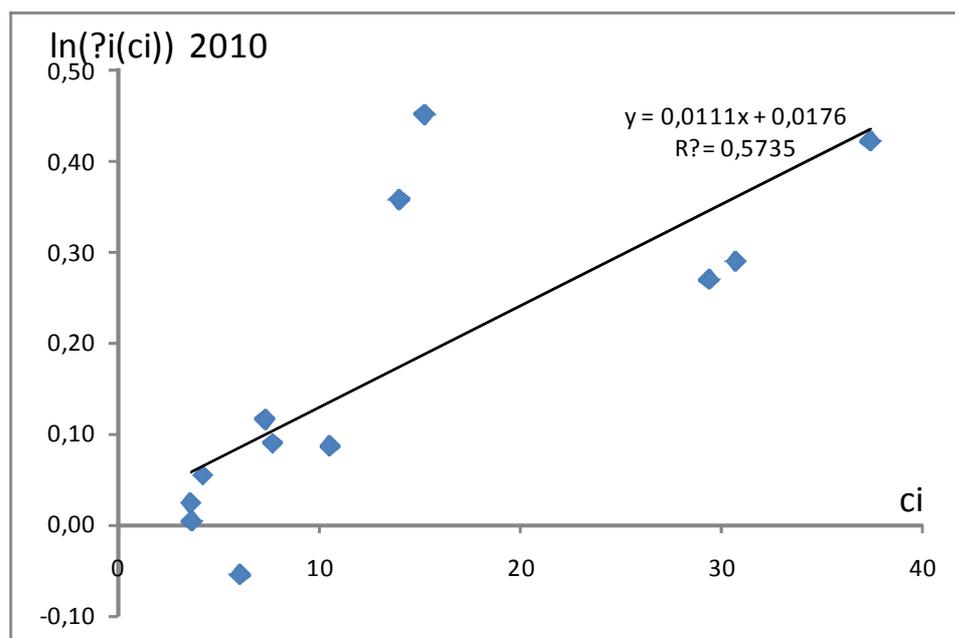
From this estimates we may conclude that imperfect competition factor is significant for Russian economy. For further research additional factors like wages growth rates could be added to the model.

Also the fact that significant regressions are for the years 2009 and 2010 which are after the crises of 2008 implies that further research of the crisis factor should be done.

Conclusion

The results obtained can be used by the Federal Antimonopoly Service to quantify the effect of concentration of production in certain sectors and quantify the effect of control measures.

The results can be used to assess the positive effects of deregulation and monopolization in certain industries.

Also, the model can be used to predict the response of prices to external shocks and their combined effect on the economy.

As part of further research it is necessary to clarify the evaluation factors, imperfect competition, so that they have more realistic. Also factor of regional monopolies is not considered, Even with large number of firms in the country markets, some firms in certain region can dictate terms.

References

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