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MARKET CLEARING PRICES IN THE AGRICULTURAL SECTOR IN TRANSITION ECONOMIES: THE CASE OF SLOVENIA

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ABSTRACT

The objective of this paper is to evaluate the degree of price convergence towards equilibrium, measuring the distance between actual agricultural price and market clearing prices with the use of econometric methods. The results show that agricultural prices have adjusted substantially to market clearing levels. Prices of all the agricultural products examined in the paper, except those of wine, potatoes and poultry meat, are, however, constrained by policy interventions. In particular, for wine grapes, apples and milk the difference between the observed and the market clearing price was close to 30% in 1994. The supply-demand clearing prices of wine, potatoes and poultry meat are lower than the actual prices during the period studied. Finally, for maize and cattle meat it seems that the observed prices were very close to the market clearing prices. The model was also used to evaluate the policy to be followed as far as the exchange rate is concerned. The comparison of the price with an average international import-export price converted into domestic currency shows that even if the price evolution of each agricultural product is different, the Purchasing Power Parity (PPP) approach would have required a revaluation of the national currency in 1992 and a devaluation in 1993.

Keywords:

SLOVENIA, AGRICULTURAL PRICE POLICY, TRANSITION ECONOMIES

1. Introduction

Since 1989, the agro-food sector in all Central and Eastern European countries has moved towards a more market-orientated organization of production, consumption and trade. The initial liberalisation of price and trade regimes and the abolition of subsidies had a dramatic impact on consumer purchasing power and agricultural incomes. The transition process had impacts on the agricultural sector, the most important being the significant shift in the relative prices of agricultural products when compared to the general level of prices.

After Slovenia's declaration of independence in 1991, a law on prices was introduced to regulate agricultural products. During the second half of 1991 the prices of essential food products were under government control, aimed at reducing inflation and at adding a social dimension to the price policy. Such government control covered the retail prices of flour, bread and also milk in 1992, 1993 and 1994. Government intervention has had a significant impact on the sugar market. Maximum wholesale and retail prices for refined sugar were introduced and since August 1993, the retail price of refined sugar has been freely determined. The wholesale price of refined sugar was controlled by a fixed intervention wholesale price. The role of government storage is also significant in the case of vegetable oils, where domestically-produced raw vegetable oils are purchased and sold at a later stage for additional processing. In the case of other products, the farm gate price and retail prices are freely determined.

The introduction of the system of freely determined prices for some products led to an increase in price fluctuations. Between 1988 and 1993 farm gate prices increased at a slower rate than inflation, except during 1992. In 1994 however, the prices of the main agricultural products increased by 24.7%, while the rate of inflation was 19.8%. In 1994 retail food prices increased by about 2% in real terms. It is assumed that the price increases observed after independence will drive the economy towards a market clearing mechanism. It might be thought that the free determination of prices would bring equilibrium to the market of each product and that the prevailing price would reflect the equilibrium price. However, the presence of rigidities in the markets as well as market imperfections may function as obstacles to the convergence towards an equilibrium price. In addition, one of the main problems being faced by the transition countries concerns the degree of protectionism that they choose to apply.

Much research on the transition of former centrally-planned economies has now been completed[7]. While the majority of the topics treated concern items such as privatisation, exchange rate policy, and macroeconomic or microeconomic aspects, little work has been done on the liberalisation of prices and on the evaluation of equilibrium price during the transition period[8]. The aim of this paper is to evaluate the degree of price convergence towards equilibrium in the agricultural sector in Slovenia by measuring the distance between actual price and equilibrium price. In quantifying this distance, the paper attempts to measure how much progress has been made during the transition from a special type of centrally-planned economy that was followed in Slovenia towards a market clearing economy. The quantification of the distance covered can be of use in two ways, either in assisting in the determination of domestic price policy (i.e. whether to increase or reduce taxes and subsidies) or in the consideration of exchange rate policy and trade liberalisation. Moreover, the distance of each price from its equilibrium level can be used to measure the distortions which prevail in the economy (see also Xu, 1988 and 1993).

The paper is organised as follows: An overview of the agricultural sector in Slovenia is presented in section 2. In sections 3 and 4 both the theoretical model for the evaluation of the equilibrium price for the domestic and foreign market and the results of the econometric estimation of the model are presented. The simulation results given in section 5 ensure the good functioning of the model and show the results of alternative policy measures. In section 6 the differences between the equilibrium price and the observed price are evaluated for ten agricultural products. Some conclusions are presented in section 7.

2. An Overview of the Slovene Agricultural Sector[9]

The importance of the agricultural sector in Slovenia is relatively low compared to that in other Central and Eastern European countries (CEEC) because agricultural production is only a small component of GDP. The impact of the policy adopted during the post-war period, which did not encourage private farming, is reflected in the low productivity of the agricultural sector and the insufficient income gained from farming. Slovene agriculture is currently facing a transformation in production, structures and markets.

Land use in Slovenia is mostly determined by soil quality. About half of the present area of Slovenia consists of forests, more than one quarter is grassland (meadows and pastures), and a significant part is marginal land in the lower region of the Alps. The amount of arable land suitable for crop production is relatively small. Most of the land is under private ownership. Agricultural and food policy

[7] See for example Brooks et al. (1991), Dinopoulos et al. (1992), Kybczynski (1991), World Development Report (1996).

[8] Among some papers on price reform in transition economies are those by Agenor (1993), Boycko (1991), Braverman and Guasch (1990).

[9] For a more detailed account of the Slovene agricultural economy with an emphasis on the economic reform of the agricultural sector see E. Erjavec et. al. (This volume).

reforms have been implemented in the area of prices, foreign trade, and the marketing system through the deregulation of distribution channels. To facilitate economic and institutional reforms the government has introduced laws concerning privatisation and denationalisation, the Fund for agricultural land, and many other measures.

Slovenia is a net importer of food and agricultural products. Agricultural products represent about 1.5% of total exports and about 3% of total imports. The overall share of agriculture and food products in total trade is higher, at about 5% of exports and 9.1% of imports. Slovenia was about 81% self-sufficient in agricultural and food products in 1993. However, because a significant share of animal feed is imported, the net self-sufficiency figure was closer to 72.4% in 1993. There is surplus production of milk, poultry, potatoes and hops, although the surpluses of both milk and poultry fell in 1994.

The purchase of agricultural products from the private sector is mostly effected through reorganised agricultural co-operatives and other enterprises. There are also direct sales of agricultural products from private farms to the food industry and to other large consumers. A small amount is also sold on the free market. The former "social" sector sells its products more or less directly to food processing industries.

Poland and the former Yugoslavia were the only countries in Central and Eastern Europe where agricultural land was not collectivised. The process of collectivisation in agriculture was abandoned in 1953. After the mid-1960s, the typical socialist collective farms no longer existed, while agricultural co-operatives became the legal, private property of members. The Law on the Privatisation of Enterprises in Slovenia came into force on 5 December 1992, and was amended in 1993.

Slovene agricultural policy makers have tended to adopt and implement similar market policy and structural measures to those in force in EU. After a general fall in agricultural producer prices in the first half of 1993, the government introduced import levies which now represent the basic market price policy mechanism in Slovenia. In addition to existing customs duties, variable import levies for live animals, meat, milk products, eggs and wine were introduced. Occasionally export subsidies, as one of the instruments of foreign trade policy, are implemented. As a result of the protectionist policies followed, domestic agricultural prices increased substantially. Measured with OECD indicators, Slovenia has higher levels of agricultural protection than the majority of Eastern and Central European countries. Current agricultural policy attempts to create a system based on market policy similar to that of the European Union.

3. The Model

One of the components of price reform in a former centrally-planned economy during the transition period would be the correct evaluation of price distortion. Reform would then be designed in such a way as to reduce any distortion and establish the right prices. However, in order to evaluate the degree of price distortion the correct price must first be measured. Given that the principal objective of the transition process is complete price liberalization and the abolition of any rigidities in the market, an attempt will be made to evaluate the distance of the so-called actual/observed price from the equilibrium and the international price. The objective of the model proposed here is to determine the market clearing price in the agricultural sector of a former centrally-planned economy, using a framework of supply-demand equilibrium[10].

In almost all the CEECs, the transition from the old to the new system has been effected through increasing market clearing mechanisms to the detriment of cost-orientated ways of price determination and market intervention. Price determination during the transition period accrued from

[10] Another model for price and quantity adjustment in agriculture can be found in Hwa (1985).

government intervention (in the form of fixed or administered prices), and evolution of cost elements, while a large number of prices are fixed freely by equilibrium of supply and demand.

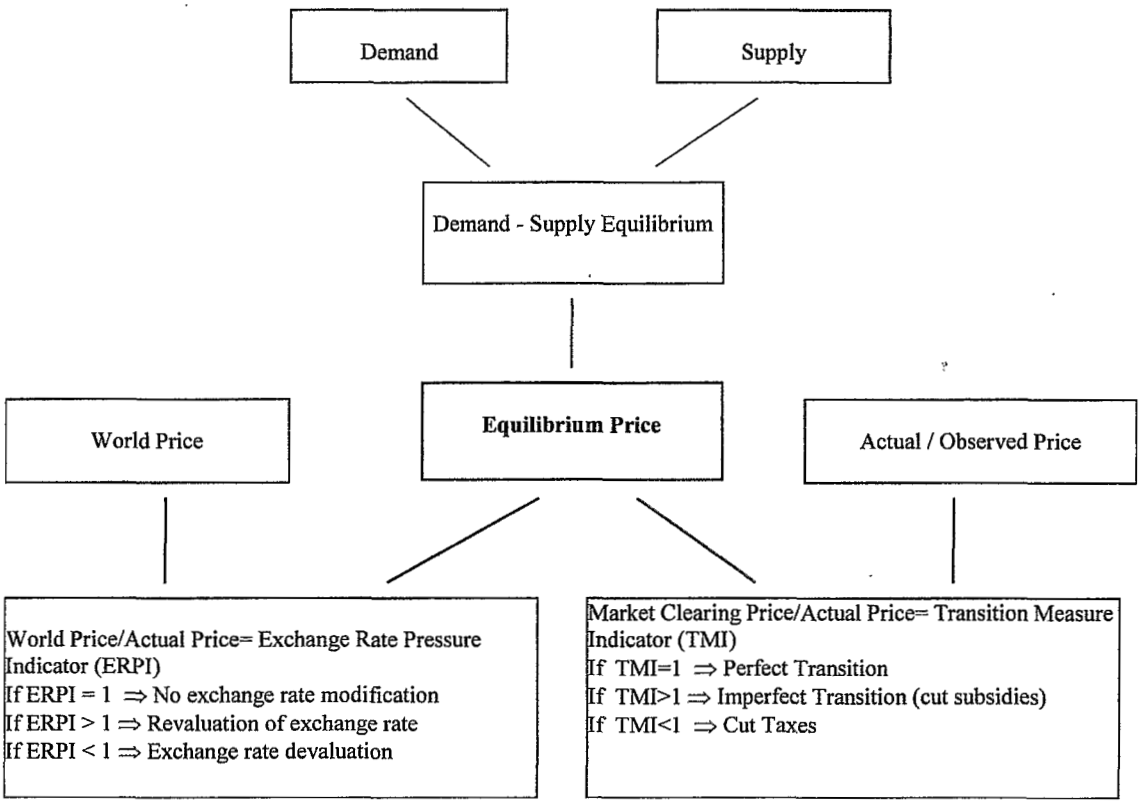
In Slovenia, as was generally the case in the former Yugoslavia, intervention was quite limited before the early Nineties and restricted mainly to the determination of the level of subsidies and/or taxes. When Slovenia became an independent country (June 1991) a law on prices was introduced to regulate agricultural products. According to the three-year program of the Strategy for Agricultural Development passed by Parliament in 1993, producer prices of wheat, milk and sugar beet as well as consumer prices of flour, bread, fresh milk and sugar were subject to government control. Agricultural prices in Slovenia have often been higher than prices at the border, and the level of protection given to agriculture is greater than in other transition economies. Slovenia has a policy of importing essential agricultural products at prices lower than those maintained for producers. This is achieved through a State monopoly, without import duties. Once the agricultural product has arrived in the country, a price is set for additional processing or consumption that falls between the lower import price and the higher domestic producer price[11].

The economic policy instruments (i.e. taxes and subsidies) directly influence the three methods of price determination described above. The price of each agricultural product, an administered, cost-based or market clearing equilibrium price to which taxes and/or subsidies are added, influences the demand and supply of the product. The shift from one system of price determination to another, for example in a case where the price of wheat is the result of a market clearing mechanism rather than having been administered, will result in some price modifications and thus influence demand and supply; the successive iterations in the market will then formulate new quantities and prices in the system. The resulting equilibrium price, compared to the actual (observed) price, will be an indicator of the degree of economic transition achieved from a centrally planned to a market clearing economy. A "Transition Measure Indicator" (TMI) which can provide information on the degree of liberalization of the economy can then be established. If TMI is equal to 1, then completion of the transition process can be assumed to have taken place. If TMI>1, then the transition has not been completed and this would mean that subsidies should be reduced. If TMI<1, the market clearing price is lower than the prevailing price; consequently taxes should be reduced.

However, liberalisation of prices is one of the major elements in the transition from a planned system to a market orientated system. The usual prescription for price reform has been to move domestic prices in the direction of international prices. Many people question the validity of such an approach because world prices are distorted. International prices for agricultural commodities are low in part because of the subsidisation of agricultural products in the EU, USA and Japan. However, small countries have to accept international prices as they are determined by world markets, and policy reform should direct domestic prices towards international prices. Moreover, the actual price can be compared to the world price of the corresponding product and an "Exchange Rate Pressure Indicator" (ERPI) derived. This indicator would give information about the competitiveness of the agricultural products on the world markets. If the world price is equal to the actual price then there should be no exchange rate modification. If, however, the world price is higher than the corresponding domestic one (i.e. the ratio is higher than 1) a revaluation of the currency should be effected if the country wishes to respect the PPP hypothesis.. If ERPI is less than one, meaning that world prices are lower than domestic prices, then a devaluation should be effected. The above mechanism is illustrated in the following diagram, in which the comparison of three alternative prices (i.e. the world, equilibrium and actual prices) for the same product is used as an indicator for the evaluation of the transition process (equilibrium price compared to observed price) and the pressure on the exchange rate (world price compared to equilibrium price).

[11] See also OECD (1995) p. 71.

Figure 1 : Price determination and its impact on supply and demand



One of the main features of the model is the use of the cobweb theorem for the determination of the equilibrium price for a certain product. The cobweb theorem is a tool to introduce dynamic elements in economic analysis. The dynamic elements are due to the sequential, non-simultaneous nature of the supply and demand decisions in the market. The supply decision is based on price information for the period *t*, and the supply is marketed in the period *t+1* according to the conditions of demand for that period. A high expected price will induce a large supply, which can only be sold at a low price. This will then lead to a relatively low supply. This will result in a sequence of highs and lows in the quantity transacted and in prices, but this is not where the story ends. A farmer will plant a certain crop not so much because he expects a high price but because he expects the price to be higher than that for other crops. On the other hand, consumers assign their purchasing power on the basis of relative, not absolute, quantity changes. Such a theoretical background would require the estimation of a dynamic simultaneous equations system; however, the lack of sufficient information and data for the variables used placed restrictions on the estimation of a static model.

The description of the model as presented above thus requires the estimation of two equations to determine the demand and supply of each agricultural product *i*.

$$D_i = f(P_i, X_i)$$
$$S_i = f(P_i, Z_i)$$
$$P_i = S_i \quad D_i$$

where X_i and Z_i are variables, other than price, influencing demand and supply respectively. When the equilibrium price is determined, one can evaluate the ratio of the equilibrium price to the observed price P^* and evaluate the TMI:

$$TMI_i = \frac{P_i}{P_i^*}$$

Moreover, given the international price P^e and the exchange rate E one can evaluate the exchange rate pressure index (ERPI) as follows:

$$ERPI_i = \frac{P_i^e * E}{P_i}$$

4. Results of the estimation

The structural forms of the equations to be estimated are the following:

$$D_i = c + D_{i-t} + \frac{P_i}{CPI} + \frac{P_j}{CPI} + GDP + \varepsilon_i$$

$$S_i = c + S_{i-t} + \frac{P_i}{PPI} + \frac{P_j}{PINP} + \frac{PINP}{PPI} + TIM + \varepsilon_i$$

where

D_i = demand for product i, P_i = price of production, CPI = consumer price index, GDP = gross domestic product, S_i = supply of product i, PPI = producer price index, PINP = input price, and TIM = time

The specification of the equations to be estimated is simple for two reasons. Firstly, we have not attempted to specify and estimate demand and/or supply equations *per se* but only to use the elasticities for the determination of the equilibrium price. Secondly (and most importantly)- during the estimation and building of the model we were restricted by the amount of available information from Slovenian data; thus even if we had wished to apply sophisticated methods, this would not have been possible. The estimated equations are based on elementary specifications aimed at introducing the basic factors that can influence the market for agricultural products. Demand for agricultural products depends positively on revenue and on the relative price of substitutes, and negatively on its own relative price. On the other hand supply depends positively on its own price and negatively on the price of fertilizer. A time trend is also introduced, representing technological change and productivity increase.

The equations for all products are estimated using ordinary least squares. The results are presented in Tables 1 and 2. A large number of equations are highly explanatory, whereas others (demand for potatoes, supply of wine grapes, maize, hops) could not be improved in terms of overall fit. However, given restrictions on data available, the equations perform well. All equations depend on the relative price and income (except for wheat) with the expected sign. The relative price elasticity is high for maize and apples and low for wine, hops and milk. According to the results of the estimation, income is shown to play an important role in the demand for agricultural products; in four out of ten products income elasticity is around 1, while the lowest income elasticity is observed for wine (0.14).

The overall fit of supply equations is satisfactory. The relative price elasticity lies between 0.7 and 0.22, while the relative price elasticity for maize is higher. The time trend seems to play a significant role in the determination of supply. In most supply equations an autoregressive term is included, showing the dynamic aspects of decisions made about agricultural production.

Table 1 - Results of the estimation of demand equations*

PRODUCT		INDEPENDENT VARIABLES						
D_i	CONSTANT	$D_{i\,t-1}$	Pi/CPI	Pj/CPI	GDP	AR(1)	$R^2_{adj.}$	DW
Wine	0.05 (1.4)		-0.1 (-0.6)		0.14 (0.8)	-0.56 (-2.0)	0.58	1.72
Wheat	0.054 (1.7)	0.56 (3.2)	-0.21 (-2.4)			-0.60 (-2.8)	0.77	2.37
Wine grapes	-0.03 (-0.8)		-0.30 (-3.1)		0.16 (0.9)		0.78	1.34
Potatoes	-0.28 (-1.9)	0.44 (1.7)	-0.12 (-1.9)		1.47 (0.8)		0.37	1.34
Maize	0.02 (0.7)	0.05 (0.4)	-0.74 (-5.8)	0.28 (1.9)	1.10 (6.9)		0.94	1.95
Hops	0.19 (6.1)	0.13 (1.4)	-0.03 (-0.3)		0.98 (3.8)		0.43	1.55
Apples	0.12 (2.1)		-0.67 (-3.9)		1.20 (5.4)	-0.61 (-3.8)	0.67	1.93
Milk	0.02 (1.9)	0.52 (4.2)	-0.01 (-0.3)		0.26 (3.3)		0.93	1.80
Cattle meat	0.002 (0.1)		-0.36 (-3.1)	0.06 (0.5)	0.30 (3.3)		0.77	1.80
Poultry meat	0.03 (1.3)	0.54 (5.8)	-0.15 (-1.2)	0.27 (1.7)	0.65 (3.1)		0.96	2.12

*All variables are expressed in logarithms.

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Table 2 - Results of the estimation of supply equations*

PRODUCT	INDEPENDENT VARIABLES								
Si	CONSTANT	$S_{i\,t-1}$	Pi/PPI	PINP/PPI	Pi/PINP	TIM	AR(1)	$R^2_{adj.}$	DW
Wine	-26.64 (-2.3)	0.30 (1.4)	0.19 (1.1)	-0.06 (-0.2)		0.01 (2.3)		0.53	1.44
Wheat	-95.32 (-2.6)	0.36 (1.4)	0.68 (1.8)	-0.53 (-1.8)		0.05 (2.2)		0.67	2.00
Wine grapes	-25.42 (-2.3)			0.01 (2.3)		0.01 (2.3)		0.45	1.66
Potatoes	0.02 (0.5)	0.72 (6.0)	0.22 (2.4)	-0.23 (-1.8)				0.66	2.56
Maize	-683.14 (-2.7)		3.20 (2.7)	-2.09 (-2.4)		0.34 (2.7)		0.55	3.15
Hops	-15.24 (-2.0)	0.37 (2.1)	0.16 (1.8)	-0.09 (-0.7)		0.01 (2.0)		0.50	2.09
Apples	0.37 (1.19)		0.07 (0.1)			0.06 (5.2)	0.74 (3.5)	0.64	2.55
Milk	-10.54 (-1.0)	0.73 (4.4)	0.13 (1.5)	-0.04 (-0.6)		0.01 (1.0)		0.91	2.57
Cattle meat	-32.52 (-7.3)				0.07 (1.1)	0.02 (7.3)		0.84	1.52
Poultry meat	0.04 (1.6)	0.97 (10.8)	0.12 (0.8)	-0.02 (-0.1)				0.92	1.85

*All variables are expressed in logarithms.

The overall fit of supply equations is satisfactory. The relative price elasticity lies between 0.7 and 0.22, while the relative price elasticity for maize is higher. The time trend seems to play a significant role in the determination of supply. In most supply equations an autoregressive term is included, showing the dynamic aspects of decisions made about agricultural production.

5. Policy simulations

The overall performance of the equations and the functioning of the model were tested with policy simulations. In actual fact, the total model consists of 10 independent sub-modules, one for each agricultural product. Each sub-module contains three simultaneous equations, i.e. two behavioural equations (demand and supply) and one identity equation (demand - supply equality) and is independent with respect to the other sub-modules.

The policy simulations effected were related to both the testing of the response of the model to different exogenous shocks and to the ability of the model to answer some policy questions of actual interest. The simulations effected are: *(i) an increase in Slovene income of 2% throughout the period; (ii) the reduction of theinflation rate by 50%, and (iii) the complete elimination of production subsidies.* The purpose of the last simulation was to *evaluate the market clearing equilibrium price of each product.*

Scenario 1: GDP increase by an additional 2%

Increased income, as expressed by the rise in GDP growth, would have a positive impact on product demand and thus create inflationary pressures. In fact, demand for all agricultural products except wheat has increased, the rate of growth ranging from 0.01% for wine grapes to 3.06% for potatoes. The impact on prices is proportional to the level of income elasticity, which influences demand and then the equilibrium price. This elasticity is zero for wheat and the overall impact on wheat is nil, while for other products the rate of growth ranges from 0.58% for maize to 9.3% for potatoes.

Scenario 2: Reduction of the inflation rate by half

In this simulation exercise we assume that the rate of growth of the general level of prices in Slovenia is reduced by half, while the prices of agricultural products are supposed to be unchanged. The reduction of the overall inflation rate significantly changes the relative prices of both demand and supply. The relative price of each agricultural product compared to the general price is increased, and the demand for agricultural products is substantially reduced. Moreover, production is affected by such a development and total supply is reduced. The fall in the quantities demanded and supplied will reduce the price of agricultural products.

Table 3 - GDP Increase by 2%

IMPACT ON DEMAND										
	Wine	Wheat	Wine-grapes	Potatoes	Maize	Hops	Apples	Milk	Cattle meat	Poultry meat
1980	0.20	0.00	0.01	2.08	1.75	1.61	0.07	0.47	0.10	0.57
1981	0.22	0.00	0.01	2.73	1.83	1.87	0.16	0.72	0.10	1.02
1982	0.22	0.00	0.01	2.94	1.83	1.92	0.22	0.86	0.10	1.36
1992	0.22	0.00	0.01	3.03	1.83	1.93	0.22	1.01	0.10	2.49
1993	0.23	0.00	0.01	3.03	1.83	2.20	0.24	1.03	0.11	3.18
1994	0.23	0.00	0.01	3.06	1.83	1.87	0.22	1.03	0.11	2.54

Table 3 - Continued

IMPACT ON SUPPLY										
	Wine	Wheat	Wine-grapes	Potatoes	Maize	Hops	Apples	Milk	Cattle meat	Poultry meat
1980	0.20	0.00	0.01	2.08	1.75	1.61	0.07	0.47	0.10	0.57
1981	0.22	0.00	0.01	2.73	1.83	1.87	0.16	0.72	0.10	1.02
1982	0.22	0.00	0.01	2.94	1.83	1.92	0.22	0.86	0.10	1.36
1992	0.22	0.00	0.01	3.03	1.83	1.93	0.22	1.01	0.10	2.49
1993	0.20	0.00	0.01	3.03	1.83	0.47	0.22	0.83	0.10	1.95
1994	0.19	0.00	0.01	2.97	1.83	1.87	0.22	0.87	0.10	2.27
IMPACT ON PRICES										
	Wine	Wheat	Wine-grapes	Potatoes	Maize	Hops	Apples	Milk	Cattle meat	Poultry meat
1980	1.07	0.00	1.01	6.55	0.55	9.91	3.41	3.65	1.37	4.58
1981	0.84	0.00	1.01	8.55	0.58	7.94	3.28	2.97	1.37	3.71
1982	0.82	0.00	1.01	9.18	0.58	7.61	3.18	2.60	1.37	3.02
1992	0.82	0.00	1.01	9.47	0.58	7.54	3.19	2.18	1.37	0.73
1993	0.69	0.00	1.01	9.45	0.58	-1.64	3.15	0.72	1.34	-4.02
1994	0.68	0.00	1.01	9.28	0.58	10.41	3.19	2.07	1.35	3.01

Table 4 - Reduction of the inflation rate by 50%

IMPACT ON DEMAND										
	Wine	Wheat	Wine-grapes	Potato	Maize	Hops	Apples	Milk	Cattle meat	Poultry meat
1980	-0.21	-1.56	-0.15	-1.14	-2.09	-0.19	-0.24	-0.04	-0.66	-0.11
1981	-0.40	-4.41	-0.34	-3.07	-4.36	-0.44	-0.89	-0.09	-1.54	-0.15
1982	-0.60	-7.46	-0.48	-4.81	-6.48	-0.65	-1.79	-0.16	-2.17	-0.27
1992	-7.03	-141.38	-4.65	-63.87	-93.29	-7.00	-24.29	-2.43	-22.65	-9.53
1993	-7.68	-158.76	-4.81	-68.69	-98.67	-8.48	-30-90	-2.68	-25.61	-14.25
1994	-7.85	-170.91	-4.91	-72.54	-101.15	-7.29	-27.76	-2.79	-25.88	-12.06
IMPACT ON SUPPLY										
	Wine	Wheat	Wine-grapes	Potatoes	Maize	Hops	Apples	Milk	Cattle meat	Poultry meat
1980	-0.21	-1.56	-0.15	-1.14	-2.09	-0.19	-0.24	-0.04	-0.66	-0.11
1981	-0.40	-4.41	-0.34	-3.07	-4.36	-0.44	-0.89	-0.09	-1.54	-0.15
1982	-0.60	-7.46	-0.48	-4.81	-6.48	-0.65	-1.79	-0.16	-2.17	-0.27
1992	-7.03	-141.38	-4.65	-63.87	-93.29	-7.00	-24.29	-2.43	-22.65	-9.53
1993	-6.49	-158.76	-4.81	-68.39	-98.27	-1.67	-26.33	-2.13	-23.04	-8.18
1994	-6-24	-170.91	-4.91	-68.90	-100.80	-7.29	-27.76	-2.34	-23.66	-10.62
IMPACT ON PRICES										
	Wine	Wheat	Wine-grapes	Potatoes	Maize	Hops	Apples	Milk	Cattle meat	Poultry meat
1980	-10.03	-5.20	-12.86	-3.10	-5.15	-6.60	-13.00	-9.71	-9.21	-12.60
1981	-26.77	-13.62	-32.73	-8.54	-13.54	-17.15	-32.49	-26.75	-22.90	-33.45
1982	-38.62	20.01	.48.83	-13.90	-19.18	-24.13	-47.28	-38.45	-33.58	-49.33
1992	-1795.21	-487.88	-4255.61	-306.82	-392.14	-592.26	-3562-12	-1716.40	-1461.25	-3565.59
1993	-1874.67	-532.65	-4831.77	-341.72	-416.29	-413.88	-3755.63	-1797.43	-1529.97	-3199.83
1994	-2005.35	-567.45	-5261.91	-343-87	-437.01	-756.70	-4262.40	-2006.56	-1643.87	-4672.64

Scenario 3: Complete reduction of subsidies

As mentioned in the introduction, production subsidies were introduced in Slovenia in order to slow down price increases. In the simulation effected here it is assumed that all subsidies are reduced to

zero; then we try to find what the possible price increase would have been in the absence of production subsidies. The simulation results show that, with the introduction of subsidies, significant price increases were avoided for all agricultural products. The most important of these were for milk and hops (which would have been 52% and 46% respectively) while the price increase for cattle meat and poultry meat would have been 9.2% and 6.9% respectively.

Table 5 - Reduction of subsidies by 100%

IMPACT ON DEMAND										
	Wine	Wheat	Wine-grapes	Potatoes	Maize	Hops	Apples	Milk	Cattle meat	Poultry meat
1992	-2.78	-13.24	0.62	-4.75	-36.32	-1.75	0.82	-0.84	-3.33	–2.36
1993	-2.58	-17.01	0.51	-5.41	-35.92	-2.14	1.92	-1.11	-3.58	-3.45
1994	-3.43	-20.86	0.14	-7.11	-43.16	-2.17	2.43	-1.52	-3.54	-2.95
IMPACT ON SUPPLY										
	Wine	Wheat	Wine-grapes	Potatoes	Maize	Hops	Apples	Milk	Cattle meat	Poultry meat
1992	-2.78	-13.24	0.62	-4.75	-36.32	-1.75	0.82	-0.84	-3.33	-2.36
1993	-2.20	-17.01	0.51	-5.40	-35.82	-0.44	1.70	-0.89	-3.28	-2.06
1994	-2.75	-20.86	0.14	-6.88	-43.05	-2.17	2.43	-1.27	-3.28	-2.62
IMPACT ON PRICES										
	Wine	Wheat	Wine-grapes	Potatoes	Maize	Hops	Apples	Milk	Cattle meat	Poultry meat
1992	32.79	45.26	40.56	32.38	34.34	43.76	33.59	48.52	8.65	14.45
1993	30.93	34.50	34.58	23.79	32.54	46.71	26.70	41.34	9.26	13.21
1994	38.69	38.81	10.89	31.80	37.15	46.38	33.28	5.2.21	9.16	6.88

6. Evaluation of the equilibrium price

The main objective of this exercise has been the evaluation of the equilibrium price and its comparison with the actual one. Such an evaluation would have been useful in measuring the divergence of a theoretical equilibrium price from that observed. The results of this simulation have been obtained by assuming that prices are freely formed in the market. In Table 6 and Figure 1, differences of equilibrium from observed prices are presented. The results show that the price of all agricultural products, except wine, potatoes and poultrymeat should have been higher if they were determined without any intervention. In fact, the prices would have been higher by up to 20% for 1992 and up to 50% for 1993 for certain products. The distance of equilibrium from observed prices is considerably reduced in 1994. As far as wine, potatoes and poultrymeat are concerned the model's result show that if prices were the result of only the price clearing mechanism, they should have been lower than the observed prices in the market.

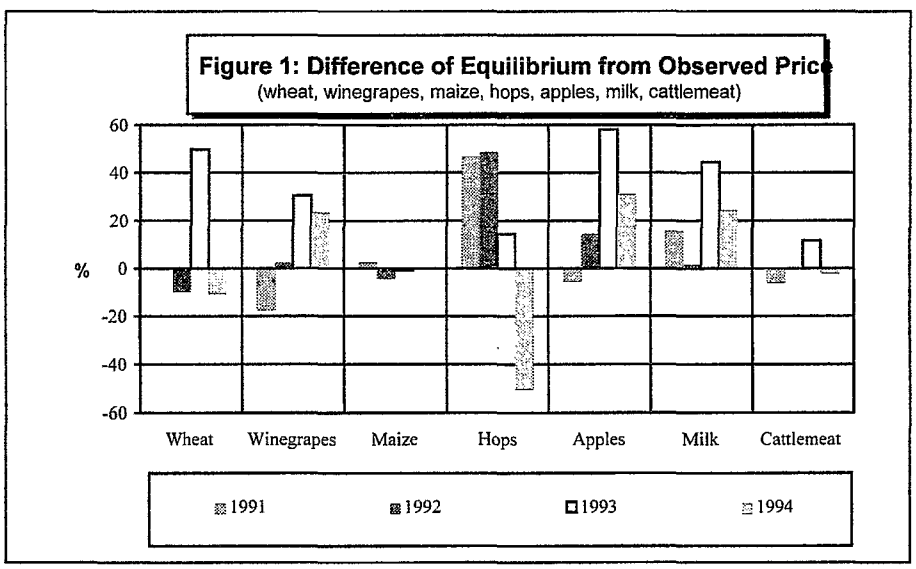
The second objective of the study was to evaluate an exchange rate pressure indicator (ERPI), i.e. an indicator that would show the exchange rate policy to be followed if one wanted to maintain the purchasing power parity for the agricultural products. To evaluate the ERPI, the equilibrium price as evaluated in the previous simulation is compared to an average international import-export price converted into domestic currency. Starting at 1991, as a base year, one can conclude that in 1992 a small revaluation of the national currency would have been necessary to keep the purchasing power parity for the agricultural products. In 1993 the situation was, however, reversed since the ERPI was lower than 1 for most products except for hops and poultrymeat (see table 7 and figure 3).

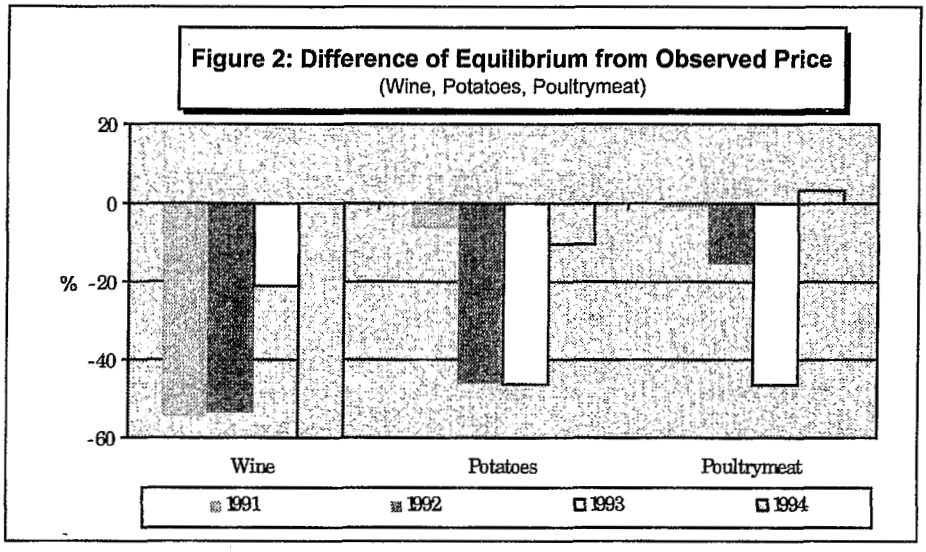
Table 6 - Difference of equilibrium from observed price

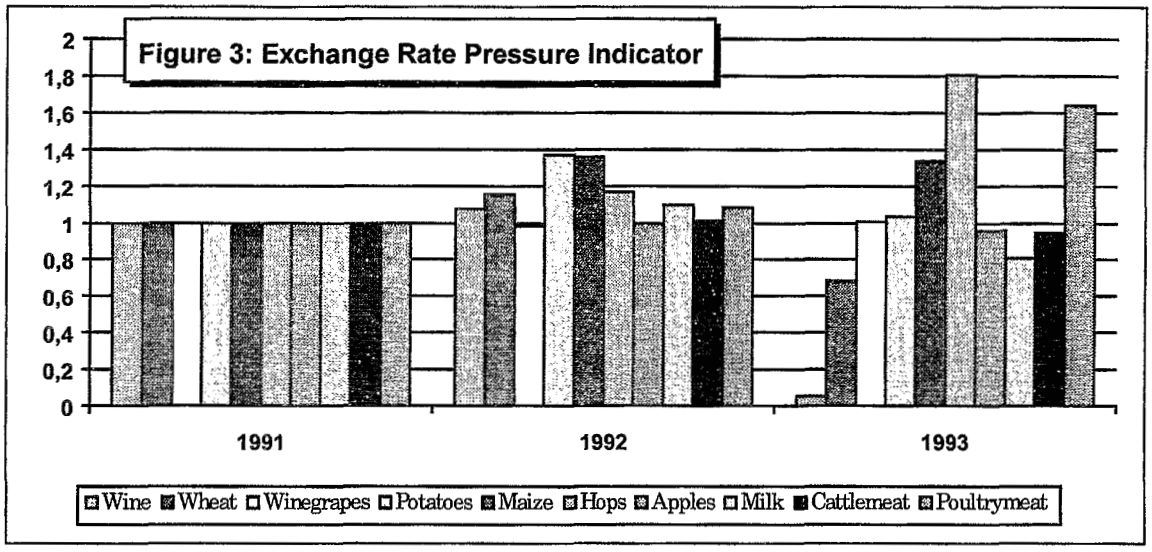
	Wine	Wheat	Wine grapes	Potatoes	Maize	Hops	Apples	Milk	Cattle meat	Poultry meat
IMPACT ON DEMAND										
1991	12.5	2.6	11.7	-0.2	2.2	-3.1	-22.1	-7.0	5.4	4.4
1992	-1.0	12.4	2.1	5.9	3.4	7.0	-86.5	3.0	0.0	23.0
1993	16.5	0.4	-8.1	13.1	-5.1	29.3	-14.4	4.1	-3.3	22.8
1994	-32.3	-10.0	-27.3	12.7	-10.7	-6.3	25.6	6.3	-2.3	15.6
IMPACT ON SUPPLY										
	Wine	Wheat	Wine-grapes	Potatoes	Maize	Hops	Apples	Milk	Cattle meat	Poultry meat
1991	12.5	2.6	11.7	-0.2	2.2	-3.1	-22.1	-90.7	5.4	4.4
1992	-1.0	12.4	2.1	5.9	3.4	7.0	86.5	3.0	0.0	23.5
1993	13.8	0.4	-90.8	12.8	-5.1	0.1	-36.5	-16.7	-90.3	13.8
1994	-27.8	-10.0	-27.3	9.2	-10.7	-6.3	25.6	-10.4	-2.2	13.9
IMPACT ON PRICES										
	Wine	Wheat	Wine-grapes	Potatoes	Maize	Hops	Apples	Milk	Cattle meat	Poultry meat
1991	-54.4	-0.2	-17.6	-6.3	2.3	46.6	-5.6	15.3	-6.0	-0.9
1992	-53.5	-9.8	2.2	-46.1	-4.3	48.5	14.1	1.4	0-0	-15.5
1993	-21.1	49.8	30.6	-46.4	-0.7	14.2	58.0	44.4	11.6	-46.4
1994	-60.0	-10.7	23.3	-10.5	-0.2	-50.5	30.8	24.3	-2.3	3.2

Table 7 - Exchange Rate Pressure Indicator

	Wine	Wheat	Wine-grapes	Potatoes	Maize	Hops	Apples	Milk	Cattle meat	Poultry meat
1991	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
1992	1,077	1,156	0,983	1,372	1,359	1,168	0,998	1,099	1,013	1,084
1993	0,052	0,683	1,008	1,036	1,339	1,808	0,960	0,805	0,946	1,642







7. Conclusion

The objective of this exercise was to evaluate market clearing prices and compare them with the prices prevailing in the market of a transition economy, in particular that of Slovenia. For this purpose we developed a market clearing supply-demand model for each agricultural product. The model specification, although being simple, incorporates all the necessary features of a market clearing economy and is applied to ten agricultural products - namely wine, wheat, wine grapes, potatoes, maize, hops, apples, milk, cattle meat and poultry meat.

The estimated equations show that demand for the above products depends on income and the relative prices of the products, while supply is a function of the relative price of fertilizer, the relative price of the product, and the time trend, representing technological advance and productivity increase. The model performs well when policy simulation exercises are carried out: a rise in GDP increases demand and supply and has inflationary impacts. The deceleration of inflation increases the relative price of the agricultural product and reduces demand and supply; it has negative impacts on the increase in agricultural prices. Finally, the elimination of all subsidies leads to an increase in prices of between 7% and 52%.

The use of estimated models for the evaluation of the equilibrium prices of agricultural products shows that all the prices of the agricultural products examined in the paper, except wine, potatoes and poultry meat, would have been higher than the observed prices if they had been determined without any intervention. In the case of wine grapes, apples and milk the difference between the observed and market clearing price was close to 30% in 1994, meaning that the market clearing price would have been almost 30% higher. The price of wine, potatoes and poultry meat would have been lower during the period studied (i.e. 1991-1994) by about 60%, 27% and 15% respectively. Finally for maize and cattle meat it seems that the observed price was very close to the market clearing price.

The model was also used to evaluate the policy to be followed as far as the exchange rate is concerned. The comparison between price and an average international import-export price converted into domestic currency shows that even if the price evolution of each agricultural product is different, the PPP approach would require a revaluation of the national currency in 1992, but a devaluation of the exchange rate in 1993.

References

Agenor, P.R. (1993). Price reform and durable goods in the transition to a market economy, *IMF Working Paper*, WP/93/47.

Barten , A.P., Vanloot, C. (1996). Price dynamics in agriculture: An exercise in historical econometrics, *Economic Modelling*, 13 (1996), 315-331.

Boycko, M. (1991). Price decontrol: The macroeconomic case for the big bang approach, *Oxford Review of Economic Policy*, Vol. 7. No 4, pp. 35-45.

Braverman, A., and Guasch, L. (1990). Agricultural reform in developing countries: Reflection for Eastern Europe, *American Journal of Agricultural Economics*, Dec. 1990, pp. 1243-1251.

Brooks, K. , Guasch, J.L., Braverman, A., and Csaki, C. (1991). Agriculture and the transition to the market, *Journal of Economic Perspectives*, Vol. 5, N.4 pp.149-161.

Dinopoulos, E., and Lane, T.P. (1992). Market liberalisation policies in a reforming Socialist economy, *IMF Staff Papers*, Vol. 39, No 3, pp. 465-494.

Erjavec, E., *et al.* (1995). *Agricultural reform, markets and prices in Slovenia.* (This volume).

Hwa, E.-C. (1985). A model of price and quantity adjustments in primary commodity markets, *Journal of Policy Modeling*, 7(2):305-338.

Kybczynski, T.M. (1991). The sequencing of reform, *Oxford Review of Economic Policy*, Vol. 7, No 4, pp. 26-35.

OECD (1995). *Agricultural policies, markets and trade in the Central and Eastern European countries, selected New Independent States, Mongolia and China -monitoring and outlook 1995*", OECD, Paris.

OECD (1996). *Agricultural policies, markets and trade in transition economies - monitoring and evaluation 1996*", OECD, Paris.

Swinnen, J. (1996). Endogenous prices and trade policy developments in Central European agriculture, *European Review of Agricultural Economics*, 23 (1996), 133-160.

World Development Report (1996). *From Plan to Market*, Published by Oxford University Press for the World Bank.

Xu, D. (1988). Background to a mathematical model of price reform in China, *Chinese Economic Studies*, Spring 1988, pp. 78-90.

Xu, D. (1993). Price distortion in the transition process: A CGE analysis of China's case, *Economics of Planning*, 26:161-182, 1993.