

Production, Consumption and Welfare Implications of Trade Liberalisation: The Case of Greek Agriculture

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Abstract

The main facts lying behind this paper are related to the current issues regarding EU policies; such as the accession of a number of Central and Eastern European Countries (CEECs) in the EU and the Doha round of the World Trade Organisation. The adopted quantitative methodology aims to estimate the expected trends in Greek agriculture following a substantial reduction in the level of protection over the 1999-2008 period. Two scenarios are examined: a baseline that simulates continuation of present agricultural policies, and one that assumes trade liberalisation. Trade liberalization has as an immediate negative effect on production, while a positive effect is true for demand. Welfare analysis results suggest a significant negative effect in producer surplus, but an overall positive trend for the net welfare effect in the case of the trade liberalisation scenario. Hence, from the efficiency point of view, the reallocation of resources through trade liberalisation is beneficial, if proper strategies are adopted to avoid additional costs due to market imperfections.

Key words: *Sector Modelling, Liberalisation, Welfare, CAP, PSE, Protection*

Introduction

Trade liberalisation is in the core of the World Trade Organisation's (WTO) political agenda. The neoclassical doctrine appears to have governed the negotiation process in the last GATT agreement (Palaskas and Crowe, 1994). The Uruguay Round restricted import protection and export subsidies and in general all market friendly policy measures. This issue has given rise to vivid interest among economists and policy-makers concerning the likely impact of trade liberalisation on the world economy, on developed and developing countries, different groups of developing countries, individual countries, sectors and products.

The issue of the possible impact of trade liberalisation through the abolishment of all support policy measures is of significant importance both for uncovering agricultural product market inefficiencies and for addressing the issue of competitiveness. Moreover, it is well known that international competition provides powerful incentives for countries to lift their economic performance by adopting cost-saving innovations or to undertake research and development to enhance the quality of their products and services. In a time of intensive global competition no country or group

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of countries can afford to become complacent if they wish to remain in the front rank (Palaskas and Crowe, 1994).

Therefore, the purpose of this paper is to estimate, adopting a partial equilibrium modelling framework, the trends that are expected in the domestic market following a substantial reduction of all protection policy measures. The main facts lying behind this paper are related to the current issues regarding EU policies: the accession of a number of Central and Eastern European Countries (CEECs) in the EU and the millennium round of the WTO (World Trade Organisation). In particular, CEECs accession to EU is expected to have an important impact in the EU agricultural policy structure.

The agricultural sector in most of the CEECs has a major role in their overall economic structure. Its relative contribution to total GDP is, on average, 6.1% in the first wave CEECs (Slovenia, Hungary, Poland, Czech republic and Estonia) compared to 2.5% in the EU and its share in total employment is 22.4% and 5.7% respectively (Tangermann and Banse, 2001). The decisions related to AGENDA 2000 do not guarantee for the viability of the system and it seems that there is still a strong need for further reforms to reduce the protection cost of the sector.

As it was mentioned above, the future of the Greek agricultural sector is related, among other factors, to the final decisions of the millennium round of WTO. The possible agreement of WTO, if the neoclassical doctrine for less or no protectionism dominates, will have a significant impact on policy alternatives and on the evolution of the agricultural sector. The WTO meeting in Doha, Qatar (November, 2001) set a framework for measures to lift barriers blocking poor countries' access to world markets, including the scrapping of tariffs and subsidies. Therefore, if the AGENDA 2000 decisions express the EU ideas for the negotiations in the WTO context it is not easy to foresee the pressure that the U.S. will put on and the magnitude of the possible changes.

The last few years a large number of quantitative models were constructed in order to address issues that are in the core of the political agenda (trade liberalisation, reform of the CAP, accession, environment etc.). Among the most important partial equilibrium models in terms of country and product coverage are: OECD's model AGLINK (www.oecd.org/agr/documents/aglink98.pdf), ESIM model (Munch and Banse, 1999), FAPRI model (Johnston et al. 1993), GAPsi model (see Tongeren and Meijl, 1999), MISS model (Guyomard et al. 1991), SWOPSIM model (Roningen et al. 1991) and WATSIM model (Lampe, 1998).

The partial equilibrium model used in this paper for the analysis of trade liberalisation effects in Greek agriculture is called Agricultural Policy Analysis Simulator (APAS) (see, Mergos and Stoforos, 1994 and 2000). The APAS is a country level partial equilibrium simulation model, which covers a large number of agricultural products. Its driving forces are the elasticity matrices (a matrix of demand and a matrix of supply elasticities) and the usual neoclassical behavioural assumptions¹.

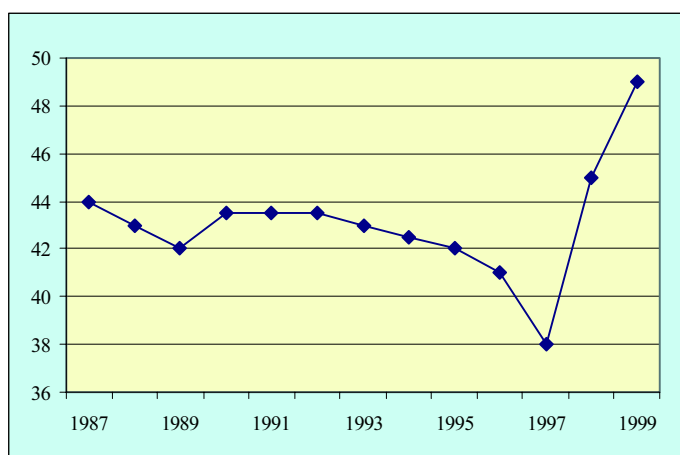
In the first section of the paper protection levels of the agricultural sector for both Greece and EU are presented. In section two the methodological framework for the APAS model and the estimation procedure are briefly discussed. The scenarios and their derived results are presented in section three. A summary and conclusions are derived in the final section.

CAP and Protection of the Agricultural Sector

The Common Agricultural Policy is, undoubtedly, the framework that determines the policy environment in the context of Greek agricultural sector. There is the view that CAP changed the relative prices of products, had an effect on external trade and on investments and a negative impact on the sector's productivity (Mergos, 2000). CAP measures also affected the overall economic activity of the country, mainly employment, since it kept a large number of employees in the sector, inflation - drove up prices of food items and of other agricultural products - and as a result had a negative impact on the non-agricultural market structure.

The diversity and complexity of the CAP policy measures is enormous and there is a need for a common measure for determining the level of market intervention. The most commonly used measure is the Producer Subsidy Equivalent (PSE) that has been adopted by the OECD (1987). The OECDs definition of the PSE is: 'the payment which would be required to compensate farmers for the loss of income resulting from the removal of a given policy measure.'

In order to have a clear understanding of CAP workings in the context of the European and Greek agriculture the Producer Subsidy Equivalent (PSE) is presented. Following CAP reform in 1992, PSE level, over the 1992-1997 period, for the EU presented a decrease (see Figure 1). However, in 1998 and 1999, support to producers, as measured by the %PSE, increased in EU and in all OECD countries except Australia and Turkey (OECD, 2000).



Source: OECD, 2000

Figure 1. % PSE for EU (1987-1999)

CAP has been severely criticised for not only being too costly, wasting resources, favouring large farming and intensive production in rich regions, but also for being discriminatory against Mediterranean products with serious implications for Mediterranean EU members (Spain, Portugal, Italy and Greece) (CIHEAM, 2000). This unfavourable policy implies that much of the income flows to Mediterranean countries from the CAP is offset by the negative trade flows that result from present protection structures.

The protection levels depend, obviously, on the commodity structure. Mediterranean countries occupy the last four places in the overall ranking of the PSE measure of support. Also, according to Table 1, the same countries present the lowest FEOGA expenditures per holding and employee in the sector. Denmark, Belgium, Germany, France, Ireland, Holland and U.K. present an average of more than 10 thousand Euros per holding, a fact that is also related to the higher (compared to southern countries) average size of holdings.

Table 1. FEOGA Expenditures per Country, Holding and Employee (thousand ECU)

	Total Expenditure (1997)	Per Holding (1996)	Number of Holdings (ths.) (1996)	Per Employee (1997)	Number of Employees (ths.) (1997)
Belgium	972.600	16,1	71	9,5	102
Denmark	1.235.300	19,6	69	12,4	100
Germany	5.774.800	10,7	567	5,6	1039
Greece	2.729.800	3,5	802	3,6	765
Spain	4.594.100	3,2	1278	4,4	1055
France	9.141.700	13,0	735	8,9	1029
Ireland	2.034.200	11,1	153	13,7	149
Italy	5.121.400	1,7	2482	3,9	1307
Luxembourg	22.600	6,6	3	5,7	4
Holland	1.756.700	13,6	113	7,0	251
Austria	858.600	5,5	222	3,4	249
Portugal	654.900	1,4	451	1,1	601
Finland	568.300	6,4	101	3,5	164
Sweden	745.200	7,0	89	5,9	127
U.K.	4.401.200	14,8	235	8,9	493
EE-15	40.611.400	5,3	7371	5,5	7435

Source: European Commission (1998), 'The Agricultural Situation in the European Union'.

The CAP measures affect explicitly producers (compensation payments, storage subsidies, deficiency payments, set aside, quotas, corresponsibility levies etc.) and implicitly both producers and consumers (tariffs, marketing certificates, variable levies, export credit and subsidies, etc.). The protection measures led EU producer prices at a much higher level relative to world prices, which has serious negative implications for household budgets (taking also, into consideration the tax payer contribution for supporting CAP). The adopted policies created a severe burden especially for poor households where marginal propensity to consumption for food products is quite high (Howarth, 2000). Moreover, consumer bundle of choices has been restricted due to various import regulations. Previous research has shown that the cost of the present policy structure is around 411Euro per EU citizen (Howarth, 2000). The estimated consumer cost is divided between higher internal prices arising from protection and taxation.

Besides consumers and taxpayers, EU industries have, in many cases, to bear the burden of support through increased input prices. The immediate result is the transfer of resources out of efficient production schemes. Moreover, the inefficient allocation of resources had as an effect the reduction of total output and income in the EU as a whole (Borrell and Hubbard, 2000).

Concerning Greece, Producer Subsidy Equivalents (PSE) have been estimated for a number of crop and livestock products (Sakellariou, 2000). Based on the available information, see Table 2, durum wheat, cotton, soft wheat and tobacco are the most heavily protected products. Olive oil presents a high PSE level but with a decreasing rate. As far as livestock products are concerned, beef, sheep and goat meat are also relatively heavily supported as expressed by the PSE measure. On the contrary, PSE for pig meat is low.

Table 2. % PSE for the period 1991-1997

	1991	1992	1993	1994	1995	1996	1997
Soft Wheat	44,8	60,6	27,5	31,9	51,8	48,1	51,0
Durum Wheat	79,4	106,5	23,6	73,8	68,6	103,3	80,1
Cotton	55,0	69,1	72,6	60,4	57,6	56,1	49,8
Tobacco	110,9	91,8	146,9	134,7	167,1	106,5	80,3
Olive Oil	47,1	48,3	100,5	67,5	19,5	16,3	31,8
Oranges	-5,1	6	19,9	31,4	34,2	0,1	-24,4
Beef	8,7	31	51,3	26,1	41,6	38,7	50,2
Sheep and Goat Meat	133,0	131,8	127,7	130,0	115,4	130,8	105,0
Pig Meat	-17,3	13,6	3,1	4,0	6,5	6,8	8,3
Poultry	16,5	54,1	59,1	47,3	53,8	44,5	49,1

Source: Sakellariou, 2000

The analysis presented here emphasises the importance of estimating the impact of policy changes in the EU context and in particular for the case of Greece, adopting a methodological framework discussed in the following section.

Methodological Framework

Trade liberalisation is often strongly criticised within any given country because of the short run adjustment costs involved. Moreover, agricultural trade liberalisation is even more strongly repelled. Protectionist policies are in place because of the social undesirability of fast adjustments created by the long run agricultural transformation.

At least two alternative explanations for systematic policy bias in agriculture have been advanced in the literature: the class theories of special interests (De Janvry, 1985), and the interest group theory (Becker, 1983). While the class theory relies on the absolute control of the State by special interests for their own benefit, the interest group theory focuses on the competitive behaviour of interest groups. According to interest group theory, policies are economic goods that are demanded and supplied with underlying egotistic motives, and perceived policies are equilibrium outcomes of this process. In this framework, various groups compete in lobby-

ing the government to guide public policy decisions in their favour and, therefore, systematic policy bias in agriculture is due to the differential political representation of interest groups (Sarker et al., 1993).

The systematic policy bias is intensified within the EU, because adjustment will not involve factors reallocation only within one country, but also across countries (Sarris, 1993). Also, as it is stated in a recent article (November 2002) in Financial Times 'the EU has created a cartel of farm ministers, answerable neither to a broad public nor even to their own colleagues but to powerful farm lobbies'. The latter can explain two very important issues for Greek agriculture: a) production over the quota levels for a number of products (i.e. cotton) and farmers expectations for an overall compensation and b) the way farmers put pressure on the Government regarding EU policies. For example, cotton production in Greece is over the maximum guaranteed quantity the last few years with an immediate result: reduction of the price that farmers receive. One of the explanations for this 'irrational' behaviour is related to farmers' expectations for an overall compensation through the pressure that they will put on the government. Therefore, it is considered important to study and analyse Greek farmers behaviour towards trade liberalisation policies so that production, and welfare implications can be examined guiding policy strategies and decision-making in the EU as well as in the domestic context.

The Agricultural Policy Analysis Simulator (APAS) model adopted in our case is a partial equilibrium, multi-market model and it is designed to analyse the economic implications, such as production, consumption, welfare etc. of policy changes. A fixed price wedge represents policy variables: a wedge between the domestic incentive price and the actual producer price. Policies are, also, implicitly introduced through price transmission parameters that regulate the transmission of world price changes to the domestic economy.

The general modelling methodology is based on the Johansen framework (Kendrick, 1990). The consumption and production equations are sub-models in which consumer and producer behaviour is respectively, optimised. The basis of the APAS model consists of a set of elasticity matrices (a matrix of demand and a matrix of supply elasticities). The elasticities used in the present model are borrowed from a previous study for Greece (Mergos et al, 2001).

Model Specification

The synthetic part of the model consists of two equations for each product: (i) supply and (ii) demand. Net trade clears the disequilibrium between domestic supply and demand. The supply function is:

$$\ln Q_i^s = \alpha + \varepsilon_i \ln P_{it} + \gamma_i \ln P_{it-1} + \sum \varepsilon_j \ln P_{jt} + \sum \gamma_j \ln P_{jt-1} + \delta_i \ln Z_a + \phi_i \ln Q_{it-1}^s + e_t \quad (1)$$

where, P is the vector of own and cross prices and Z are other deterministic variables (i.e. trend, etc.). Own price, cross price and income are the main explanatory variables in demand equations. The general form of the demand equations is as follows:

$$\ln Q_i^d = \beta + m_i \ln P_{it} + \delta_i \ln P_{it-1} + \sum m_j \ln P_{jt} + \sum j_j \ln P_{jt-1} + n_i \ln I_{it-1} + \gamma_i \quad (2)$$

where Q_i^d is the demand of product i , P_i is the corresponding price, P_j the price of other products (substitutes or complements) and I the income. Finally, the functional representation of the conducted welfare analysis is:

$$\Delta PS = (P_{Mod} - P_w) * Q_{sw} + 1/2(P_{Mod} - P_w) * (Q_{SD} - Q_{SW}) \quad (3)$$

$$\Delta CS = -[(P_D - P_w) * Q_{DD} + 1/2(P_D - P_w) * (Q_{DW} - Q_{DD})] \quad (4)$$

$$\Delta T = -[(P_{Mod} - P_D) * Q_{SD} - (P_D - P_w) * (Q_{DD} - Q_{SD})] \quad (5)$$

$$\Delta NW = \Delta PS + \Delta CS + \Delta T \quad (6)$$

where, ΔPS is the change in producer surplus, ΔCS is the change in consumer surplus, ΔT the change in the taxpayers effect, ΔNW the change in the net welfare effect (dead weight loss), P the price and Q the quantity. With the subscript 'Mod' are reported the current producer prices plus any additional subsidies, with the subscript 'w' the world prices and with the subscript 'D' the prices that are currently paid by consumers.

Scenarios and Results

The examined scenarios cover the 1999-2008 period and are: a) baseline - BS that assumes continuation of the present agricultural policy structure and b) trade liberalisation - TLB where the possible impact of the removal of all measures that protect the sector is examined. The products under consideration are cereals (soft and durum wheat), tomatoes, olive oil, tobacco, cotton, beef, pig meat, sheep and goat meat and milk. The reason these products were selected is related to their share in value of production, cultivated area (for crops) and trade. Namely, according to 1999 data, the share of cotton in total value of production is 9,7% and 11,6% in total cultivated area. Tobacco has a 5,0% share in total value of production and 1,8% in total cultivated area. Tomatoes have a 4,9% share in total value of production and 1,1% in total cultivated area. Finally, olive oil has a 14,5% share in total value of production and 18,7% in total cultivated area.

Concerning trade, despite the increase in livestock production, the agricultural trade balance shows a deficit due to the large amount of imports of livestock products (mainly due to beef and pig meat). Crop products have a positive trade balance but there is a negative trend between 1996-1999. As it can be seen from Table 3, the share of crop products in total exports decreased from 93% to 87% and at the same time the share of livestock products increased. The products with the highest share in exports in 1999 are olive oil, tobacco and cotton. On the other hand, the products with the highest share in imports in 1999 are beef and pig meat followed by cereals.

The derived results are presented in Table 4. The different price levels defined in the various scenarios have considerable influence on all indicators of interest (production, consumption and welfare). More precisely:

1. The immediate effect of trade liberalisation is the reduction of production. This result is consistent with the previous analysis based on the PSE levels. EU prices for the majority of products under consideration are higher than the world price levels. As a result, the introduction of world prices in the domestic market will act as a disincentive for Greek producers and they will lower or even abandon their current production schemes.
2. Demanded quantities, on the other hand, present a positive trend. Common Agricultural Policy led consumers, through higher internal prices, and taxpayers through the budget support, to bear the burden for the agricultural sector subsidi-

sation. If trade liberalisation policies are introduced, consumers will enjoy lower prices leading to higher demand for agricultural products (depending on the magnitude of price elasticities).

3. Since the agricultural sector is the supplier of inputs for food and other industries, price reduction will lead to lower production costs and consequently to lower final product prices for the industry. However, due to market imperfections consumers might not gain through trade liberalisation policies, and the benefits might spread between retailers and processors through increased transaction costs.

Table 3. Share of Imports and Exports (% of Total)

	Imports			Exports		
	1990	1996	1999	1990	1996	1999
Beef	16,99	8,75	9,22	0,09	0,18	0,23
Pig Meat	5,14	6,56	5,56	0,03	0,05	0,06
Sheep and Goat Meat	1,14	0,94	1,15	0,02	0,04	0,06
Milk	0,92	1,03	1,49	0,01	0,01	0,04
Cereals	2,60	3,36	2,47	6,15	2,11	1,03
Tomatoes	0,00	0,11	0,06	0,12	0,04	0,07
Olive-Oil	0,71	0,21	0,11	10,04	16,21	12,92
Tobacco	1,56	2,90	2,85	12,28	8,84	11,16
Cotton	2,11	0,48	0,24	4,57	11,56	10,59
Livestock Products	49,80	40,16	41,04	6,97	8,67	12,65
Crop Products	50,20	59,84	58,96	93,03	91,33	87,35

Source: Eurostat

Results of the welfare analysis are summarised in Table 5 and confirm the dependency of domestic producers on compensatory payments eligibility (Katranidis and Velentzas, 2000).

In the case of trade liberalisation, budget support will be reduced, thus resulting in a substantial income decrease for domestic farmers. Producers will be the main losers through trade liberalisation policies due to the prior high subsidisation of CAP. Producer surplus presents a negative change for all products under consideration and in particular for those where the internal EU price was much higher than the corresponding world price. Regarding the products under consideration, it is important to mention that the most significant decrease will occur for cotton, olive oil, beef and tobacco.

Two important issues must be discussed at this point: a) producers are at the same time consumers of other agricultural and non-agricultural products and as a result the decrease of producer surplus will be offset to some extent by the positive welfare effect from lower prices and b) policy decisions regarding who is going to gain or loose from a certain action must be weighed with a social index where the desirability of promoting a policy is measured against the negative effects upon a particular population group (i.e. farmers).

Table 4. Production, Consumption and Trade (2010)

	Scenario 1: Base line			Scenario 2: Liberalization		
	Production	Consumption	Trade	Δ Production (%)	Δ Consumption (%)	Trade
Soft Wheat	641	1003	-362	-8	35	-764,3
Durum Wheat	1161	620	541	-7	34	248,9
Tomatoes	2031	2026	5	5	0	106,5
Olive Oil	450	229	229	2	-1	232,3
Tobacco	110	46	64	-43	6	13,9
Cotton	990	566	424	-26	0	166,6
Beef	62	265	-203	-30	10	-248,1
Pig Meat	132	262	-130	-2	6	-148,4
Sheep and Goat Meat	113	164	-51	-2	14	-76,2
Milk	703	967	-264	-19	22	-610,3

Source: APAS Estimations

Δ Production and Δ Consumption refer to percentage changes from the baseline scenario.

Table 5. Welfare Indicators (million Euro)

	Δ PS	Δ CS	Δ T	Δ NW
Soft Wheat	-35,2	36,5	8,2	9,5
Durum Wheat	-54,0	11,8	49,8	7,6
Cotton	-366,5	0,0	446,7	80,2
Olive Oil	-210,6	114,5	140,8	44,7
Tobacco	-74,6	33,6	47,9	6,9
Beef	-83,2	66,2	52,8	35,8
Pig Meat	-12,0	24,2	-6,1	6,1

Source: APAS Estimations

Δ PS refers to the change in producer surplus, Δ CS to the change in consumer surplus, Δ T to the change in the taxpayer effect and Δ NW refers to the change in the net welfare effect.

The introduction of world prices in the domestic market (trade liberalisation scenario) has an important impact on consumer surplus. In particular, the results are positive for all products under consideration. Concerning taxpayer effect, the results are positive for the majority of the products (except pig meat). Finally, the net welfare effect is also positive. The important transfer of resources that will occur under the trade liberalisation scenario will have a positive contribution to the total economic activity of the country if pre-liberalisation policies are in effect.

Summary and Conclusions

Over the last two or more decades producer prices in EU tend to be in a much higher level compared to the world prices implying a negative effect for household budgets (taking also, into consideration the tax payer effect for supporting CAP). Moreover, the inefficient allocation of resources has as an impact the reduction of total product and income in the EU as a whole.

The constructed APAS model, covers the period 1999-2008. The products under consideration were soft wheat, durum wheat, tomatoes, olive oil, tobacco, cotton, beef, pig meat, sheep and goat meat and milk. Two scenarios were examined, namely a baseline that assumes continuation of present agricultural policies, and a trade liberalisation.

The results refer to production, consumption and trade. The introduction of world prices in the domestic market led to an immediate reduction of production. Demand, on the other hand, will present an upward trend. As it is known, CAP through a complex set of policy instruments transferred the cost for protecting the sector to consumers and taxpayers. Through trade liberalisation, consumers (and processors) will enjoy lower prices and as a result the demand for agricultural products will increase.

The welfare analysis emphasise the importance of the equalisation of domestic to world prices. Producers will be the main losers. While, consumers will enjoy a surplus for all products under consideration. Concerning taxpayers, the results indicate a positive effect for the majority of the products (except pig meat). Finally, the net welfare effect is also positive. Hence, from an efficiency (both productive and allocative) point of view, the reallocation of resources through trade liberalisation policies will be beneficial to society if proper strategies are used to avoid additional costs due to market imperfections.

Overall, the adoption of world prices in the domestic market will act as a disincentive for producers and will increase demand. Consumers and taxpayers will benefit at the expense of farmers. That, however, would be unevenly distributed among the various products due to the uneven protection levels between products under the CAP.

Greece has the time, since an agreement in the WTO context cannot be seen in the near future, and the ability to develop a strategic plan for the development of the sector. The key issue is competitiveness. Farmers that are not able to compete in the world market, sooner or later they will have to change their production schemes or even abandon the sector. Considering that Greece has by far the largest share of employees in the agricultural sector (almost 17% of total employment) compared to the EU average, its reduction must be expected in the years to come.

Finally, future work should be undertaken to improve the existing modelling framework for forecasting agricultural magnitudes and analysing the impact of alternative price and non-price (decoupled) policies. The improvements on the policy framework refer to: a) the introduction of input side through which the problem of decoupled payments of the CAP will be introduced; b) the endogenization of the price determination and c) the introduction of socio-economic and environmental indicators.

Notes

It is important to state that the APAS model combined with a Policy Analysis Matrix is currently used for Slovenian negotiations with the EU (see Erjavec et al., 2002).

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