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Assessing the Comparative Advantage of Albanian Olive Oil Production

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Abstract

The main objective of this study is to evaluate the comparative advantage of olive oil production in Albania using Policy Analysis Matrix (PAM) method. The result indicates that olive oil production in Albania is profitable for the producers. Whereas the DRC ratio equals to 2.2, meaning that olive oil production in Albania does not have a comparative advantage for the given situation of production, prices and technology. This means that while it is profitable for private producers to manufacture olive oil for the domestic market, it does not have a comparative advantage with other EU countries.

In order for Albania to develop an olive oil industry comparable to neighboring countries with similar climatic and soil conditions, the country will need to achieve higher productivity similar to those countries.

Keywords: olive oil production, PAM, comparative advantage, Albania

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Problem Statement

The Albanian economy's transition from a centrally planned to a market economy is associated with a considerable number of structural and institutional reforms necessary for a sustainable market economy. At the beginning of the economic reform period, Albanian authorities paid special attention to strengthening the macroeconomic environment by implementing appropriate monetary and fiscal policies to decrease the budget deficit. In addition, trade liberalization policies were implemented with the goal of stabilizing Albania currency oscillations. Price controls were also eliminated as the economy was decentralized to balance the supply and demand of goods and services.

Since the 90s, Albania has gone through a series of political and socio-economic upheavals, which have adversely affected agricultural productivity and the agro-industry. This period had also impacted the balance of the foreign trade for agricultural products. Imports have increased substantially, followed by a considerable reduction of exports creating a 9:1 trade deficit for the period.

Despite the progress made, especially in terms of macroeconomic and financial stability, Albania continues to have one of the lowest levels of income per capita in Europe (Civici, 2003). In addition, there is a large income gap between rural and urban areas residents. Since the agricultural sector is about 59% of the total labor force and 25% of Albania's GDP, Albania's economic growth and political stability can be achieved though strengthening the agricultural sector. The country's current political stability along with its climatic, geographic, and cultural advantages provides the opportunity for fast and sustainable growth in the agricultural sector.

Like many of the other agricultural products, the major supply of oil (vegetable and olive) in Albania comes from imports, due to the inconsistent and unreliable local supply of raw materials needed by the oil processing industry. Furthermore, many oil processing plants were destroyed after the 1990s, and the distribution infrastructure linking to markets is poor. With current prices and expected yield, the low economic returns do not provide farmers with the incentives needed to grow oil-bearing plants.

Albania is one of the few countries in Europe, and the only country in Central East Europe, that has favorable climatic and geographical conditions for olive cultivation, and its history here is as old as other Mediterranean countries. In the process of transitioning the Albanian agriculture sector to more market oriented, olive and olive oil production will remain one of the mainstays of the agro-food industry. The main reason the olive sector will be sustained as the country develops its economy is because Albania is one of the few countries in Europe where olives can be widely cultivated due to its favorable climatic and soil conditions. Albania farmers are familiar with the cultivation of olives, and ancestors have passed on successful practices to the current generation. The olive culture is a national treasure. The demand for olive oil and table olives in the domestic market is very high. Furthermore, with technological improvement in the olive processing industry, this product could be traded in the international market. Olive farming is seasonal, with most of the labor concentrated in the winter months of the year. During this same period other agricultural activities requires little labor, making it advantageous to produce other products during the olive off-season generating more farm household income.

Objectives

The purpose of this study is to identify the comparative advantages of olive oil production in Albania relative to other major EU olive oil production countries under various price and productivity changes.

To accomplish this study's objective within the Policy Analysis Matrix (PAM) framework, the analytical methods of the Private Cost Ratio (PCR) and Domestic Resource Costs (DRC) ratio were used.

Data Collection

The central and south-western parts of Albania were selected for the study area as most olive trees are cultivated there. According to Annual Statistical Report (2006) of the Ministry of Agriculture, Food and Consumer Protection, 90% of the olive cultivation is in these areas. The primary data used in this study came from questionnaires administered to 145 olive oil processing plants and from olive producers that supply to the olive oil processing factories. Only 126 Albanian processing plants completed the questionnaires resulting in a response rate of 86.8 %. Face-to-face interviews were conducted at the processing site, as e-mailing the questionnaires for responses are difficult in Albania due to the lack of adequate electronic networks and computer-based communication skills. The survey was carried out from April to June 2006 and they were collected for the production year 2005-2006.

The questionnaires were developed based on literature review and discussions with olive oil industry experts. There were two questionnaires. The first questionnaire was developed for the olive producers and the second questionnaire for the olive oil processors. We divided the survey in this manner in order to develop a budget for the olive oil processing industry. Issues like olive production, olive prices, cost of labor, cost of water, cost of land, revenues received, and income of the processing plant were the main foci of the questionnaire. There were also questions for marketing related issues and quality of the olive oil. 60% of the questionnaires were conducted by the researchers. The remaining 40% were administered by third-year undergraduate students who were trained in the survey protocol.

Secondary data such as import and export taxes were obtained from the Ministry of Food and Agriculture (MFA), the Institute of Statistics (INSTAT) and International Fertilizer Development Centre (IFDC) in Tirana.

Methods and Procedures

In order to fulfill the main objective of the study we used the Policy Analysis Matrix - PAM framework developed by Monke and Pearson (1989), augmented by a recent development that dealt with price distortion analysis by Masters and Winter-Nelson (1995), which accounts for the valuation of nontraded inputs. The PAM has been applied to several countries (see, Agraja 2006; Khachatryan 2002, Barichello et al. 1998; Yao and Tinprapha 1995; Nelson and Panggabean 1991). The crux of the PAM has to do with the profit and loss identities that are familiar to any business (Nelson and Panggabean, 1991). The primary strength of the PAM is that it allows

varying levels of disaggregations and makes the analysis of policy-induced transfer straightforward. Along with this strength, PAM also has weaknesses, one of which is the assumption of fixed input-output coefficients. However for the case of Albania the technologies have been quite traditional and are still the same.

PAM is the conceptual approach used to analyze data and is a stylized general equilibrium and policy-oriented simulation model (Khachatryan, 2002). The model used here is of a static nature. The greatest advantage of PAM is that it allows for the disaggregation of any production activities and thus their costs. The cost components are straightforward and can be gathered at a much disaggregated level depending on the data source. In a sense, the PAM model at the plant level is quite close to a partial equilibrium analysis. In the PAM framework the indicators for policy scenarios and economic efficiency are estimated and introduced exogenously in the model resulting in relatively reliable outcomes.

The PAM however inherits some limitations and it does not examine explicitly the economic relations between sectors of the economy and dynamic effects of the policy to be studied. The PAM assumes fixed levels of certain macroeconomic variables as well. In order to minimize the weakness of the PAM, sensitivity analysis is conducted in this study allowing for variations in the world input and output prices, and macroeconomic variables such as exchange rate and agricultural policies.

The PAM method distinguishes between private and social profitability. Private profitability (shown in the first row of Table 1) is determined using the actual input and output prices prevailing in the domestic market. Private value refers to actual, observed values for revenues and costs in this study. These values reflect the prices paid or received by the farmer or paid by the processors in the agricultural system. The private prices incorporate the economic costs or values plus the effects of all distorting policies and market failures.

Social profitability, shown in the second row of the Table 1, provides a measure for the comparative advantage. Social value measures the comparative advantage or efficiency of an agricultural commodity. These values are efficient measures because the inputs and outputs involved in the system are valued at their social opportunity costs. When we talk about the private value, we also have to deal with the effect of the distorting policies which the social value eliminates.

The PAM method distinguishes between tradable and non-tradable factors, inputs and outputs. The tradable factors are commodities or services, which are imported or exported. Fertilizers, seeds and seedlings, pesticides, machinery and various containers, packaging materials and fuel are tradable inputs. Factors, which do not enter the international market, such as labor, land, capital and water are non-tradable or so called domestic factors.

Such distinction is necessary for the social value estimations also known in literature as shadow, efficiency, accounting, economic, opportunity cost/prices or value of marginal physical product. Social prices are intended to reflect the true economic value of outputs and inputs in the absence of taxes, subsidies, tariffs and quotas, price control and other effects due to government policies or market failures. The social price for an agricultural commodity is the border price – the price

at which foreign suppliers would deliver the commodity to the domestic market or the price that foreign consumers would pay domestic suppliers to deliver the commodity to their markets (Monke and Pearson 1989). In this study the Italian market is the reference market, where Albania exports most of its outputs and from where it imports fertilizers, fuel, containers, labels and other tradable production inputs. The appropriate social values of tradable outputs and inputs are given by world prices – c.i.f. import (c.i.f. Italy, adjusted for transportation and insurance costs to Albania) prices for importable goods and services and f.o.b. prices (or c.i.f. Italy minus transportation and insurance costs from Albania) for exportable goods.

The social value of the non-tradable factors is estimated by the net income is forgone because the factor is not employed in its best alternative use, or opportunity costs.

Labor costs are set by the legislated minimum wage in Albania, but the labor market generally ignores this and it is unregulated. Regional labor markets are competitive, and there is surplus of labor relative to available opportunities. The opportunity cost of labor is assumed to be reflected in the private wage.

The opportunity cost of capital utilized in this study is the Albania Central Bank's interest rate. The shadow price of water is calculated using the actual purchase price plus the subsidy. The general framework of the PAM is given in Table 1.

Table 1. General Framework of Policy Analysis Matrix

	Revenues	**Costs**		**Profits**
			Domestic	
		Tradable inputs		
			Non tradable factors	
Private prices	A	B	C	D=A-B-C
Social prices	E	F	G	H=E-F-G
Effects of divergences and inefficient policy	I=A-E	J=B-F	K=C-G	L=I-J-K
p^p_i, p^s_i	private and social prices per unit of the i^{th} output;			
p^p_j, p^s_j	private und social prices per unit of k^{th} domestic factor;			
a_{ji}, a_{ki}	input-output coefficients			
π^p_i, π^s_i	private und social profits per unit i^{th} output;			
D-Private profits		J-Input Transfers		
H-Social Profits		K-Factor Transfers		
I-Output Transfer		L-Net Transfers		

Source: Monke and Pearson (1989)

From the PAM results, there are different indicators of profitability and comparative advantage that can be measured like, Private Cost Ratio (PCR), Domestic Resource Cost (DRC), Nominal Protection Coefficient (NPC), Effective Protection Coefficient (EPC), and Profitability Coefficient (PC). Only two of the indicators in the PAM structural model are the focus of this study - Private Cost Ratio (PCR) and Domestic Resource Cost (DRC). The estimation of these two indicators will help us determine if olive oil production in Albania is profitable and also whether the country has a comparative advantage over neighboring countries.

The empirical application of the Policy Analysis Matrix (PAM) begins with an assessment of revenues, costs, and profits using private (actual market) prices. Data on private revenues and costs are entered in the top row of the PAM, often termed the "private row." The private cost ratio (PCR) explains the ratio of domestic factor cost (C) to the value added in private prices (A-B). This ratio demonstrates the ability of the production system to cover the cost of the domestic factors and continue to be competitive. This ratio is important for investors because they can optimize their profits by minimizing the costs of tradable inputs and factors. If the PCR ratio is between 0-1 this means that producing the agricultural goods is profitable for the farmer, where as if the ratio is greater or less than this range the farmer makes no profit.

(1) PCR = Cost of non tradable inputs / (Revenues - Cost of tradable inputs) = C / (A-B)

or

(2) $PCR = \Sigma_k a_{ki} p^p_k / (p^p_i - \Sigma_j a_{ij} p^p_j)$

The second step in the empirical application of the Policy Analysis Matrix (PAM) is an assessment of revenues, costs, and profits in social (efficiency) prices. Data on social revenues and costs are entered in the middle row of the PAM, commonly called the "social row." To estimate the comparative advantage of a commodity, in this case the production of olive oil, this study utilizes the DRC estimation described by Monke and Pearson (1989) as a ratio of the opportunity cost of domestic factors of production per unit of value added in world prices. The DRC ratio is calculated using the formula:

(3) DRC = Cost of non tradable inputs / (Revenues - Cost of tradable inputs) = G / (E-F)

or

(4) $DRC = \Sigma_k a_{ki} p^s_k / (p^s_i - \Sigma_j a_{ij} p^s_j)$

The value of the DRC ratio indicates whether the production of a commodity has a comparative advantage for a given country. It estimates the efficiency of the use of domestic resources to save (or earn) one unit of foreign exchange. The interpretation of the different DRC value is given in Table 2 below:

Table 2. Interpretation of DRC Ratios

DRC Ratios	Interpretation	Conclusion
DRC = 1	The economy neither gains nor saves foreign exchange through domestic production	Economy in balance
0 < DRC < 1	Value of domestic resources used in production is less than value of the foreign exchange earned or saved	Comparative advantage
DRC > 1	Value of domestic resources used in production is greater than value of foreign exchange earned or saved	No comparative advantage
DRC < 0	More foreign exchange is used in production of a commodity than the commodity is worth	No comparative advantage

Source: Khachatryan, 2002.

Because productivity and price change due to technological advances and supply and demand balance, sensitivity analysis varying price and yield was carried out. Sensitivity analysis is a good tool for revealing the changes in the comparative advantage when specific parameter changes. It can be used to assess the effects of possible changes or errors in the evaluation of technical coefficients of the production budgets, or errors and fluctuations in the market prices. The sensitivity analysis parameters for this study are yield and production and world reference prices of olives. The DRC ratio was calculated by changing the values of the basic model parameters (prices and production) by ±5, ±10, ±15 and ±20% to assess the impact of possible changes due to fluctuation in these parameters.

Results

From the PAM analysis we have first developed the budget for the olive oil production. (Appendix 1) The budget is presented in two main columns, representing the private and the social price. All revenues and costs of production are measured in private and social prices, reflecting the main components of PAM matrix. Also an important point of the budget construction is the disaggregation of the cost in tradable and non tradable. Tradable inputs are goods traded internationally. Domestic factors refer to land, labor and capital.
From PAM construction we have the following results:

Table 3. Results from PAM Analysis for Olive Oil Processing Industry, in Albanian Lek

	Revenues	**Costs**		**Profits**
		Tradable inputs	Domestic factors	
Private prices	8,575,000	5,314,416	2,292,596	967,988
Social prices	4,645,526	2,890,997	3,897,996	-2,143,467
Effects of divergences and inefficient policy	3,929,474	2,423,419	-1,605,400	3,111,455
DRC = 2.2				
PCR = 0.703				

Private Cost Ratio

From the calculation of the collected data, the following results were obtained:

PCR = 2,292,596 / (8,575,000 – 5,314,416) (in Albanian Lek)
PCR = 0.703

The result indicates that olive oil production in Albania is profitable because the ratio is between the intervals {0-1}. This indicate that producers have positive financial incentives to continue or to expand production

Domestic Resource Cost

From the calculations using the survey data, the DRC ratios are:

DRC = 3,897,996 / (4,645,526 – 2,890,997) (in Albanian Lek) = 2.2

The DRC ratio equals to 2.2 which shows that Albania currently has no comparative advantage in the olive oil production. The estimated DRC ratio indicates that the value of domestic resources used in the production of olive oil is more than the value of foreign currency earned.

Sensitivity Analysis

As the PAM is a static model which cannot capture the potential changes in prices and productivity, these results are subject to change with market conditions. For example, changes in either international prices or parity prices of tradable inputs can change the values of DRC. The sensitivity analysis illustrates how the PCR and DRC ratios for olive oil production react to various parameter changes and how olive production and olive oil prices can alter the PCR and DRC ratios. Based on the results above and assuming that is the real situation of these parameters in Albania, we change the parameters by ±5, ±10, ±15 and ±20%. Table 4 shows what the changes in the PCR and DRC ratios are when the productivity parameters were changed by the above percentages.

Table 4. Sensitive analysis by changing the olive oil yield

	DRC ratio for olive oil	**PCR ratio for olive oil**
Base scenario	*2.2*	*0.703*
-20%	4.7	1.48
-15%	3.97	1.3
-10%	3.1	1.25
-5%	2.7	0.91
+5%	2.15	0.62
+10%	1.98	0.59
+15%	1.7	0.5
+20%	**1.45**	**0.46**

Source: Adapted from Nguyen 2004, computed data

We have an improvement in the scenario (+20%) as expected, where the PCR ratio is still in the interval {0-1} so the product is still profitable if production increased by 20%. While the DRC ratio has decreased considerably, from 2.2 in 1.45, it is still not in the range of {0-1}, where it has a comparative advantage. When changing the production by -20%, Albania olive production is not profitable to farmers and of course does not have a comparative advantage.

The results of a second scenario of changing the olive oil price by ±5, ±10, ±15 and ±20% can be seen in Table 5. In this case, the DRC ratio is 1.0 suggesting that when olive prices increased by 20% Albania's olive oil industry has a comparative advantage. Furthermore, even when price decreases between 5-9%, the product is still profitable.

Table 5. Sensitivity analysis by changing the olive oil price

	DRC ratio for olive oil	PCR ratio for olive oil
Base scenario	*2.2*	*0.703*
-20%	3.2	1.52
-15%	2.9	1.31
-10%	2.71	1.07
-5%	2.4	0.89
+5%	1.97	0.61
+10%	1.5	0.49
+15%	1.33	0.41
+20%	**1.0**	**0.39**

Source: Adapted from Nguyen, 2004, computed data

Conclusions

Currently Albania is importing the majority of its food fats, even though it has considerable potential to be self-sufficient. In 2006-2007, 42 thousand hectares were planted with olives, with a total of 3.6 million olive trees. Because of suboptimal care and management of the trees, Albanian olive production has grown very slowly and exhibited very high yield fluctuations, when compared to neighboring countries. The insufficient olive supply affects the oil processing industry, resulting in low output and low quality of olive oil.

Using the data taken from the 126 olive oil processing plants, PAM analysis indicates that olive oil production is profitable. The Private Cost Ratio was estimated at 0.703, meaning that production is profitable for the country's private enterprises.

However, the results of Domestic Resource Cost analysis indicate that Albania does not have a comparative advantage in the olive oil producing industry, at least for the 2006-2006 production years. The calculations resulted in a DRC = 2.2. This means that it is not socially desirable for the country to produce and expand olive oil production in Albania, as the use of domestic factors is not efficient in economic terms. Comparing the two values of the above ratios, in the given situation olive oil production seems to be profitable within the country with actual market prices, but not with social prices. In other words olive oil production is profitable for the farmer/producers but it is not profitable for the country to produce it, under given local and international prices.

According to the sensitivity analysis, parameters like olive oil quantity and olive and olive oil price are very important in the final analysis of private and social profitability of the olive oil production in Albania.

Changing parameters in the sensitivity analysis shows that increasing the olive oil production and olive oil price in the industry, the domestic resource cost ratio enters in the interval values in which we can say that olive oil production is competitive in Albania. In order to make the olive

oil industry globally profitable, there is a need for state policy intervention. The government should invests in more research to increase productivity, marketing and decrease input costs subsidies to producers.

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