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A QUANTITATIVE ANALYSIS OF OLIVE OIL MARKET IN ITALY

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Abstract

The general objective of this contribution is that one to bring back the results of a study lead in the Italy territory relatively to the various elasticity regarding the price of determined olive oil producers and to estimate empirically a question system (using A.I.D.S. model). Moreover an example of the scanner data applicability is showed. The all focused towards the empiric definition of the critical variables for the question of the trade category of extravirgin olive oil. It's obvious that this study wants to supply some operating instruments in order to assume the strategies focused on a precise market. The result of this study are numerous: principally, this concern to the analysis methodology (combining use of software TSP 5.0 and the scanner data) and to the Italian olive oil market.

Key Words: Marketing research, Almost Ideal Demand System, Consumer behaviour

Topic Groups: Marketing and consumer behaviour, Business strategy, Research methods

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INTRODUCTION

Every theoretical demand model has to consider “no market” aspects. These aspects are characterized by no staticity which determines over time a great variability on consumer behaviour. These changes follow different directions led by individual behaviours. Therefore it is necessary to find out specific tools to aggregate those variables and estimate with a good level of approximation.

In this context, a wide range of models has been elaborated to obtain consistent applicative results and to develop correlations among the critical variables, PRICE and INCOME, and a set of independent variables in the long period.

Surely, to be effective in problem solving a deep knowledge of the issue and its different dimensions is required. To investigate peculiar aspects of a sector, it is important to analyse its demand function, because it explains many structural peculiarities of it.

Although health benefits related to daily extra-virgin olive oil consumption are well-known, level of consumption is still quite low compared to other vegetable fats. However, low level of consumption can be seen as an important opportunity for a future development of extra-virgin olive oil consumption.

In Italy, olive oil sector is affected by ancient structural problems and it needs interventions aimed to enforce its competitiveness, especially now that consumption is expected to increase. So, it is worth being considered a system to determine and assess which market levers are fundamental to strengthen the sector also at international level.

From those initial inputs, it is possible to understand that extra-virgin olive oil market is extremely heterogeneous, considering both demand and supply. Thus, it is important to search the right combination to develop a demand model which focus on a difficult to sector understand through classical techniques.

THEORY

In the theoretical context, in order to contrast the problems of static structure of the conventional models, the *flexible functional forms (FFF)* have collected a remarkable success in the empirical works. In particular, from the beginning of '80s, the *Almost Ideal Demand System* model (*AIDS*) of Deaton and Muellbauer has acquired a remarkable interest thanks to its ability to be adapted for various cases studies on *time series* data. The use of this same has been remarkable, especially in the context of the food sector.

Few studies have however focused their interest on the extravirgin olive oil sector. In fact, recently, this market (also thanks to some discoveries in medical field), has acquired an interesting development, dimensionally and economically. This has motivated some scientists to move partially their scientific interest from the other food sectors to the olive oil one.

For such purposes, the information resource acquires a very strategic importance. Thanks to the advent of scanner data (the data rescued from the reader laser of the bar codes at the supermarket points of sale), the information becomes ready available and without errors or missing values. These data, at the present, show only two weak points: first of all, the difficulty to manage a such great amount of data; secondly, the cost for purchasing from the firms owning the data (*A.C. Nielsen* and *SymphonyIRI group*). The present job applies on national oil sector data of, the theoretical approach of Ideal model.

From the result emerged on the statistics and econometric elaboration (using software *TSP*), some considerations of remarkable strategic interest are showed. The extravirgin olive oil

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market characterizes for a marked dichotomy between few big companies and a lot of numerous small producers. The first ones have an extension on all territory, while the little ones are legacies to local niches.

Moreover, from the data emerged, acquire significance, to the aims of the competitive context, the promotion strategies, particularly used in the supermarket channel. Also in this case, a strong discrepancy is showed between the use promotion lever of the great companies, plus continuous, regarding the small enterprises. It's strategic, like in other sectors, the increasing role that are assuming the Private Labels, in constant increase on all territory).

At last, extravirgin olive oil sector is clearly still characterized from a remarkable elasticity of the pricing effect on the volumes of expenditure.

Methods

The econometric analysis of the extra-virgin olive oil demand in Italy has been conducted considering monthly observations on main brands of extra-virgin olive oil category.

Information source is *SymphonyIRI* and it provided disaggregate quantitative data; in this case the disaggregation is based on territorial criterion. In fact, the data are divided into four groups, one for each geographical macro-area considered: two in Northern Italy (North-East and North-West), one in Centre Italy and Sardinia (Centre), and another one in Southern Italy (South).

The survey has been conducted according to this division, because it is assumed those four markets present differences in structure and elasticity. In fact, the values of socio-cultural hexogen variables estimated during the study of the sector are very different in each area (e.g. in the South, there are many family micro-firms). These data represent a statistically significant and representative sample of the total national coverage. In particular, for each analyzed product, the data set considers monthly sales volumes and average prices during promotional and non-promotional period, over the time period 2005-2007.

A series of models have been estimated to study the relationships among the extra-virgin olive oil demand in retailing sector, prices vector and total purchase. The computing process to obtain the final demand system consists of several steps.

The most critic passage is the preparation of the data-set which then will be run by the software. Firstly, producers have been identified as the variable to investigate. So, mean companies of the sector have been selected on the basis of the turnover over the time period from 2005 to 2007.

Tab. 3 shows companies ranking resulting from turnover analysis on the available data. Clusters defined by a single element are marked in blue; those constituted by more elements are marked in purple.

Tab. 3 - Olive oil mean producers

Ranking	Producer	Volume turnover (€)
1	Other Producers	90.918.051
2	Sos	78.446.916
3	Ufi	58.923.524
4	Private Label	55.330.033
5	Monini	33.749.175
6	Salov	18.382.317
7	Farchioni Olii	15.118.773
8	Agri Desantis	9.187.057
9	Olearia Desantis	6.295.715
10	Coricelli	6.135.079
11	Costa D'Oro	2.172.020
TOTAL		374.658.660

Source: SymphonyIRI data elaboration, 2009

Volume Selling, Average Price Selling and Promotion Selling Percentage are the variables considered to determine system. Only five groups are considered to don't have a too much complicate system.

The Other Producer group represent all small producers, existing in all zones of Italy, under one percent of total turnover. It's decided to create this group to have a general consideration of all olive market with the purpose to estimate more precisely the global elasticity.

After groups definition, the database has been constructed according to two priorities: first, careful execution of data entry in software basic scheme, and second, elaboration of model equations through TSP software.

This program is used to compute main descriptive statistics of the data set considered. Furthermore, during the process a new variable (pp_i) is created to standardize data by median value. Thus, from the ratio between the variable and the new variable, it is obtained a new standardized variable (pr_i), and its logarithm is the final result (pi_i).

Market share and expenditure are considered dependent variables. Expenditure is defined as ratio between variable pr_i and quantity q_i . While market share is calculated dividing every single case study expenditure and total market expenditure.

The independent variables are: logarithms of the prices, log of the expenditure, and Stone's index which presents two fundamental passages. First step, market shares of the single case studies are standardized again in relation to median value. In this way a new value called wm_i , is defined.

Tab. 4 - AIDS equation system

$$eq1, w1 = a1 + prom1 * prom_perc1 + a11 * pi1 + a12 * pi2 + a13 * pi3 + a14 * pi4 + (-a11 - a12 - a13 - a14) * pi5 + b1 * y$$

$$eq2, w2 = a2 + prom2 * prom_perc2 + a12 * pi1 + a22 * pi2 + a23 * pi3 + a24 * pi4 + (-a12 - a22 - a23 - a24) * pi5 + b2 * y$$

$$eq3, w3 = a3 + prom3 * prom_perc3 + a13 * pi1 + a23 * pi2 + a33 * pi3 + a34 * pi4 + (-a13 - a23 - a33 - a34) * pi5 + b3 * y$$

$$eq4, w4 = a4 + prom4 * prom_perc4 + a14 * pi1 + a24 * pi2 + a34 * pi3 + a44 * pi4 + (-a14 - a24 - a34 - a44) * pi5 + b4 * y$$

Source: theoretic elaboration, 2009.

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Where:

- wm_1 represents producer 1's market share;
- a_1 is the intercept;
- $prom_1 * prom_perc_1$ represents one of the shifters which use the correspondent observation entered;
- a_{11} is the parameter of price 1 relative to producer 1's market share;
- pi_1 is the logarithm of price 1;
- a_{12} is the parameter of price 2 relative to producer 1's market share;
- pi_2 is the logarithm of price 2;
- a_{13} is the parameter of price 3 relative to producer 1's market share;
- pi_3 is the logarithm of price 3;
- a_{14} is the parameter of price 4 relative to producer 1's market share;
- pi_4 is the logarithm of price 4;
- $(-a_{11}-a_{12}-a_{13}-a_{14}) * pi_5$ is the fifth parameter obtained from the computing process;
- B_1 is one of the equation parameters;
- Y is the proportion between the logarithm of the expenditure and Stone's index.

At this point, it has started to elaborate the descriptive statistics and, then, the econometric calculations, inserting the elaborated data inside TSP program. Firstly, the program has been tested by a example panel data to certificate the presence or not of error on language running codex.

Findings

The results from the elaborations are very interesting to explicate national olive oil market and its characteristics. In particular, they represent a first attempt to have a general quantitative idea about this strategic market and about the critics variables determining its development or not. Results and graphs below.

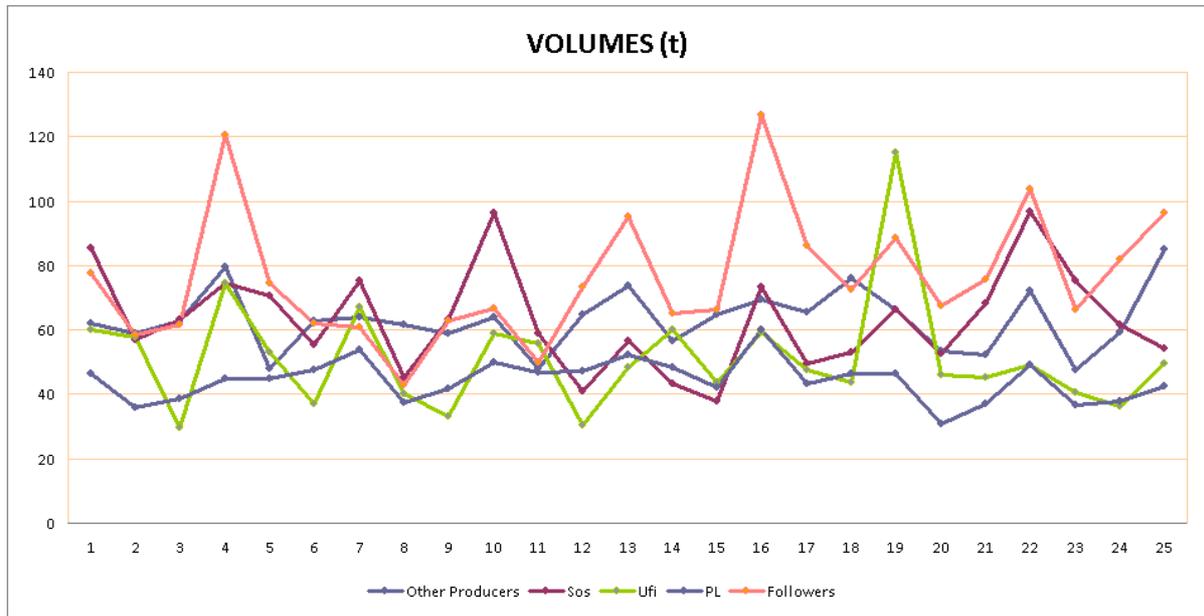
Tab. 4 - Descriptive statistics sample

	Other Producers			Sos			Ufi			Private Label			Followers		
	Vol (t)	Pr (€)	Vol in prom (%)	Vol (t)	Pr (€)	Vol in prom (%)	Vol (t)	Pr (€)	Vol in prom (%)	Vol (t)	Pr (€)	Vol in prom (%)	Vol (t)	Pr (€)	Vol in prom (%)
AVERAGE	63,04	5,78	43,21	63,02	4,78	53,66	51,29	4,65	63,56	44,35	4,99	22,05	76,16	4,82	59,76
STD. DEV.	9,56	0,44	8,37	15,62	0,48	10,35	17,43	0,43	10,97	6,55	0,41	8,43	20,19	0,39	8,74
VC	0,15	0,08	0,19	0,25	0,10	0,19	0,34	0,09	0,17	0,15	0,08	0,38	0,27	0,08	0,15
MEDIAN	62,61	5,83	44,11	61,48	4,70	53,62	48,24	4,64	66,41	44,99	5,12	21,71	72,48	4,87	60,93

Source: SymphonyIRI data elaboration, 2009.

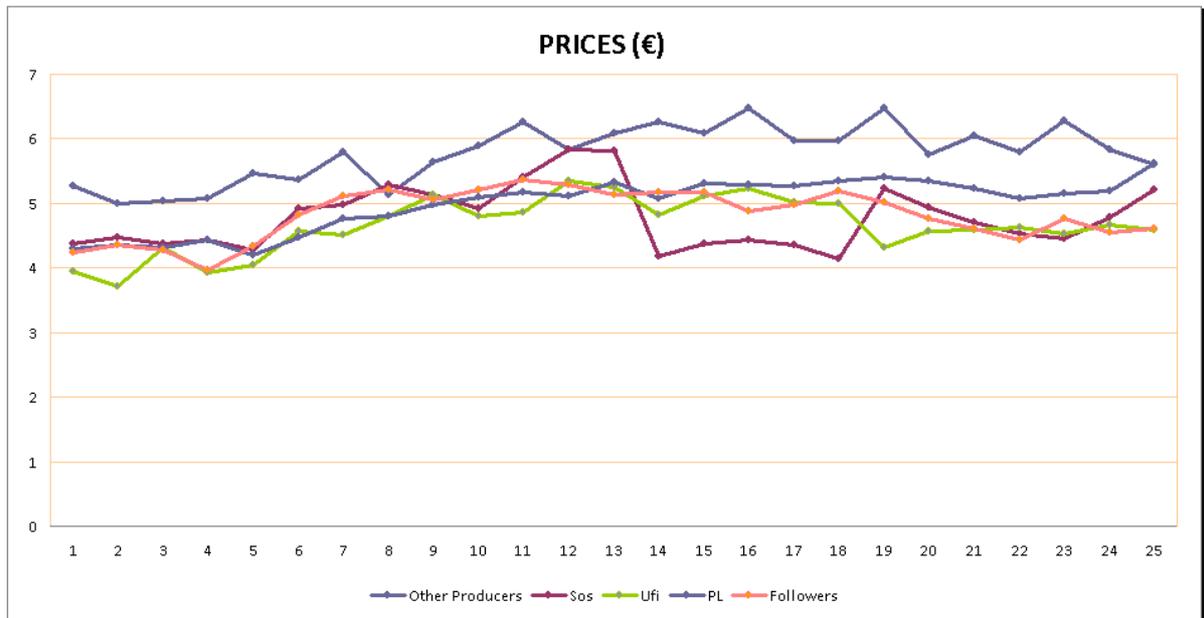
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Graf. 1 – Volumes Trend



Source: SymphonyIRI elaboration data, 2009

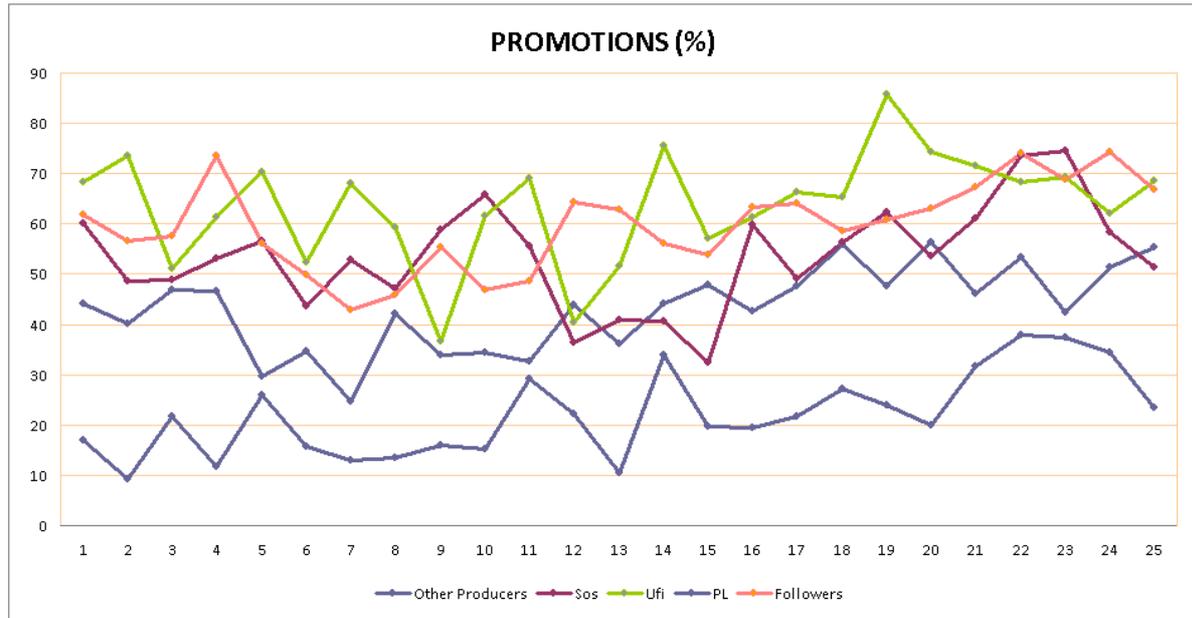
Graf. 1 bis - Average prices trend



Source: SymphonyIRI elaboration data, 2009

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Graf. 1 ter - Promotion volumes trend



Source: SymphonyIRI elaboration data, 2009

Then findings from running process have been analyzed and the first parameter object of evaluation has been “promotion”, assuming this is the mean parameter to considerate regarding price elasticity.

Tab. 5 - Promotion parameter estimate

	Parameter estimate	Standard Error	t-statistic	P-value
PROM1	0,2154 E-02	0,3956 E-03	5,4489	[,000]
PROM2	0,3082 E-02	0,3943 E-03	7,8173	[,000]
PROM3	-0,2249 E-03	0,4971 E-03	-0,4523	[,651]
PROM4	0,8573 E-03	0,2942 E-03	2,9143	[,004]

Source: TSP running data elaboration, 2009.

The general assumption is the promotion parameter is very important in olive oil section, that is considered a rich product (with a unit price higher than other sections). In this case, the promotions is to consider one of the means lever for a producer in a commercial channel to increase his turnover and to expand itself.

After this, it has been possible to estimate the elasticity between five producers group and, from this process, a lot of interesting considerations have exited. The table under carries the different elasticities of the demand system after the running process.

Tab. 7 - Parameter analysis findings

	Parameter Estimate	Standard Error	t-statistic	P-value
HE11	-1,6510	0,1817	-9,0855	[,000]
HE12	0,0221	0,1198	0,1845	[,854]
HE13	0,5376	0,1851	2,9041	[,004]
HE14	-0,2489	0,1826	-1,3630	[,173]
HE15	1,3130	0,2864	4,5841	[,000]
HE22	0,0150	0,1809	0,0830	[,934]
HE23	-0,2301	0,1468	-1,5677	[,117]
HE24	-0,1686	0,0951	-1,7736	[,076]
HE25	0,0276	0,2480	0,1111	[,912]
HE33	-3,7269	0,5046	-7,3860	[,000]
HE34	0,5682	0,1971	2,8826	[,004]
HE35	2,9216	0,4407	6,6294	[,000]
HE44	-1,7251	0,2683	-6,4304	[,000]
HE45	1,7018	0,3517	4,8382	[,000]
HE55	-4,0345	0,5194	-7,7671	[,000]

Source: TSP running process data elaboration, 2009.

Extra-virgin olive oil consumption is affected by price variation; so its demand function is expected to be very elastic. In the same way it is reasonable to consider all the markets initially considered to divide the data and all the brands analysed very elastic. Hence, it is necessary to make a distinction on the basis of the significance of the answer to price variation. In some cases this answer is not statistically significant.

In fact, apart from the brand 2, the other brands present an elastic demand, above all brands 3 and 5. This result is extremely useful to the companies to elaborate marketing strategies, as it means that it is possible to act on the lever of costs without affecting consumers answer.

Generally it is possible to state that when the price of a good is negative related to market share of another good, then those goods are complementary and there is no replacement between them. In the opposite case, if the price of a good is positive with respect to the market share of another good, then a replacement effect exists. Between the two goods considered.

Indeed, the table shows that producers 1, 3 and 4 present high level of replacement with the category called "Followers" (group number 5).

To the aims of an more tightened market analysis, this determines a strong embrittlement, remaining fixed the other variable, that allow that the lowering and the increasing prices choices are strategic decisions and to take after careful reflections. To guaranty of this, in order to come down in the market specificities and in the analyzed cases study, it showed as the elasticity values are high and this determines an extremely hard market answer regarding the companies price policies

After all, is shown a market much competitive where the main groups (that inside contain more brand, many of which famous and dislocated on a national level, many other legacies to local niches) attest all on levels of price for quality relationships, more or less equal, or, however, re-entering in a defined range.

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However, There is a market power suspicion of brand 2 (*Sos*) due to the inelastic demand and due to the absence of marked substitution effects with other producers. In fact This is translate in a leadership position in the comparisons of the competitors and this is essentially due to of the preferential channels or however due to the fidelity brand of own that the group has constructed in the years.

Therefore, there is need to investigate power market causes and the effects that can be practised on the pricing lever. Moreover, it is necessary to inquire recently acquisitions of brand *Sasso*, which could have allowed to the group to obtain a market leadership position of the oil of olive in the north - west Italian.

In general terms, from the carried out analysis, the extravirgin olive oil market is shown as a market in which the consumer is careful to advertising and pricing variable. This obviously involves, from the groups of producers, the policies of pricing strategic management careful and aimed to maintain our share in the general market.

Discussion

All the econometric process has assumed a big importance thanks to the use of scanner data, new type of information very lend to the theoretical model application; a form of boosting for the university agencies could be favourable or, however, when the scope of these data use is, rather than of commercial nature, of academic and search nature.

Carrying out an overview on the extravirgin olive oil section and, in particular, on the domestic market, it has been looked like this is a strategic section, not only from the productive point of view, but also for the role that itself plays in the world competitive context. While markets as the wine are now in a phase hard saturation (in which the only “save shape” could be probably a push to the product diversification), the olive oil market has still various possibilities of expansion especially in foreign markets, in which still it is hard the presence of other fat vegetables that, at the moment, are playing a substitute role.

At last, the attention has been placed on the location of the characteristics that influence the preferences of the Italian extravirgin olive oil consumers, with detail reference to determined Italian zones and to the complex of the exogenous and endogenous variables that influences the sector.

However, according an aprioristic mink, the variable to insert in this study, in order to verify of the significance relationships, could be numerous. And this could regard the exogenous variable as the season, or the months temperature or, still, the different climatic zones.

Extremely interesting could turn out a study that puts to comparison the *AIDS* approach with other models. As it has been looked, the studies that have confronted this model with others are numerous (es. the *Rotterdam* model, *LES* model). Extremely profitable could be to compare the elasticity deriving from the two theoretical systems.

The division of the groups could turn out profitable, various carried out, regarding that taken in consideration in this elaborated. Like saying, some groups have been “forced” for analysis requirements. Sure, a development of the present work will look at the division of the Followers group and the realization of a group for every element, with the aim to take in the correct consideration all important enterprises of the sector.

Also inside the group Other Producers could be meaningful to preview a some form of division, with the aim to create more small but more homogenous cluster. Still, from the assumptions carried out, would very interesting to express the market shares, the turnovers and the relative elasticity, using the single brand of market. This would carry to of the mainly

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operative results from a management point of view, with consequent positive evidences for the companies future business choices. At last, assuming the substitution effect with other oils and vegetables fat, an interesting step could be to inquire all the segments of this category.

Conclusions and Implications

The “functional flexible forms” give extremely profitable results for the overcoming of theoretical obstacles, at the contrary of the so-called “interest or fixed forms”. Important, in such sense, is the study has put to comparison the *AIDS* model with others famous flexible forms (Barnett and Seck, 2006).

The character of innovation of the present work turns out from the integrated approach between a standard model, the executed process of running with operative software and the original data set. In general, it has been looked like the olive section price is the most important variables and, therefore, the same market turns out enormously flexible regarding variations of the same one. This finds confirmation also in precedence studies on the same section (Pierani and Rizzi, 1991; Siskos, Matsatsinis and Baourakis, 2001).

At last, the attention has been placed on the location of the characteristics influencing the preferences of Italian extravirgin olive oil consumers, with detail reference to determined variable and, at the same time, the complex of the exogenous and endogenous factors that influences they. This is an important conclusion because it permit to create specific strategies to drive the consumer chooses and, at the same time, it permit to firms producing principally the products request by market without disperse financial resources. More, a lot of are the factors to investigate to implement still own market strategies and create profitability.

The significance of the chosen model is rather good, in fact, it is an approach by now standardized and used operatingly for market researches.

From the present job, there fore important considerations about the future developments of the olive oil market can emerge.

Sure, a successive step will be to expand the distance of esteem to all Italian specific zones to understand the presence or not of differences between the elasticity of the national market regarding the elasticity of particular zones and discover the variables that determine this difference.

References

- Abadia A., (1985), "Income distribution and composition of consumer demand in the Spanish economy", *European Economic Review*, **29**: 1-13.
- Abler D., Shortle J., (1992), "Potential for Environmental and Agricultural Policy Linkages and Reforms in the European Community", *American Journal of Agricultural Economics*, **4**: 78-86.
- Ahmad Z.B., Zainalabidin M., (1994), "Demand for meat in Malaysia: an application of the almost ideal demand system analysis", *Pertanika, Journal of Social Science and Humanities*, **1**: 91-95.
- Baker J.B., Bresnahan T.F, (1985), "The gains from merger or collusion in product-differentiated industries", *Journal of Industrial Economy*, **4**: 427-444.
- Baker J.B., (1999), "Encouraged by the simultaneous development of new econometric tools and computerized point of sale scanner data", *The Journal of Economic Perspectives*, **48**: 22-28.
- Barnett W. A., Seck O., (2006), "Rotterdam vs Almost Ideal models: will the best demand specification please stand up?", Munich Personal RePEc Archive, Munich.
- Capps O.Jr. (1989), "Utilizing scanner data to estimate retail demand functions on meat products", *American journal of agricultural Economics*, **71**: 750-760.
- Chavas J.P., Segerson K., (1987), "Stochastic Specification and Estimation of Share Equation Systems", *Journal of Econometrics*, **35**: 337-358.
- Chevalier J.A., Kashyap A.K., Rossi P.E., (2003), "Why don't prices rise during periods of peak demand? Evidence from scanner data", *American Economics Review*, **93**: 15-37.
- Cotteril R.W., Ronald W., (1994), "Scanner Data: new opportunities for demand and competitive strategy analysis", *Agricultural and Resource Economics Review*, **23**: 125-139.
- Cotterill R.W., *et alii*, (1994). "Market Strategies in Branded Dairy Product Markets", *Research Reports* 25.149, , Food Marketing Policy Center, University of Connecticut.
- Deaton A., (1986), "Demand Analysis", *Handbook of Econometrics*, **30**: 1767-1839.
- Deaton A., (1988), "Quality, Quantity, and Spatial Variation of Price", *American Economic Review*, **78**: 418-430.
- Deaton A., (1985), "Panel data from time series of cross-section", *Journal of Econometrics*, **30**: 109-126.
- Deaton A., Muellbauer J., (1980_b), "Economics and Consumer Behaviour", Cambridge University Press, Cambridge.
- Deaton, A., Muellbauer J., (1980_a), "An Almost Ideal Demand System", *American Economic Review*, **70**: 312-326.
- Dell'Amico M., Toth P., (2000), "Algorithms and codes for dense assignment problems: the state of the art", *Discrete Applied Mathematics*, **100**:17-48.
- Haller L.E., Cotteril R.W., (1996), "Evaluatin traditional share-price and residual demand measures of market power in catsup industry", *Review of Industrial Organization*, **11**: 293-306.
- Jones A., Mazzi M.G., (1996), "Tobacco consumption and taxation in Italy: an application of the QUAIDS model", *Applied Economics*, **28**: 595-603.
- Lau L.J., (1986), "Functional forms in econometric model building", *Handbook of Econometric*, Stanford University.
- Mata F.J., Fuerst W.L., Barney J.B. (1995), "Information technology and sustained competitive advantage: A resource-based analysis", *Mis Quarterly*, **4**: 487-497.
- Moro D., (2002), "Analisi della domanda. Teoria e metodi", *Franco Angeli Editore*.

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September 8 – 10, 2010, Olbia, Sardinia, Italy

- Pierani P., Rizzi P.L.(1991), “An econometric analysis of the olive oil market in Italy”, *European Review of Agricultural Economics*, Oxford.
- Pierani P., Rizzi P.L., (1989), "Separabilità delle Preferenze e Domanda al Consumo di Grassi Vegetali e Burro: 1967-85", *Rivista di Economia Agraria*, **46**: 65-79.
- Porter M.E., Millar V.E, (1985), “How information gives you competitive advantage: the information revolution is transforming the nature of competition”, *Knowledge and special libraries*, by Butterworth-Heinemann, 85-103.
- Siskos Y., Matsatsinis N.F., Baourakis G., (2001), "Multicriteria analysis in agricultural marketing: The case of French olive oil market”, *European Journal of Operational Research*, Elsevier.
- Stigler G.J., (1947), “Notes on the history of the giffen paradox”, the journal of the political economy, 9: 152-157.
- Stone, (1954), “Lineare expenditure system and demand analysis: an application to the pattern of British demand”, *The Economic Journal*, **4**: 131-143.
- Swamy G., Binswanger H.P., (1983), “Flexible consumer demand system and linear estimation: food in India, *American Agricultural Economics Association*.
- Swastika D.K.S., (2002), “ Medium-and long-term prospects of rice supply and demand in Indonesia”, ”, *Developments in the Asian rice economy* by Sombilla M., Hossain M and Hardy B., International Rice Research Institute, Philippines.
- Varian H., (1992), “Microeconomic Analysis”, 3rd ed. New York: W.W. Norton and Company.
- Wang Q., Halbrendt C.C., Jensen H.H., (1997), “China’s Beer Consumption and Barley Imports”, *Agribusiness*, **13**: 73-84.
- Working H., (1943), “Statistical laws of family expenditure”, *Journal of the American Statistical Association*, **221**: 43-56.
- Wu Y., Wu H.X., (1997), “Household Grain Consumption in China: Effects of Income, Price and Urbanization” *Asian Economic Journal*, **11**: 325-342.