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**Analysis of the Socio-Economic Impact of the Tobacco CMO Reform on
Italian Tobacco Sector**

Filippo Arfini, Michele Donati and Davide Menozzi
University of Parma
Dept. of Economics, Unit of Agri-food Economics
filippo.arfini@unipr.it



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Abstract

The Tobacco CMO (Common Market Organization) is involved in a intense debate between the European tobacco industry and those who are against to a crop whose transformed product is dangerous to the health. European institutions have shown a strong interest in this complex issue introducing two Reforms (1992 and 1998) and one revision in 2004. This paper aims to analyse and investigate the socio-economic impact of the tobacco CMO Reform of 2004 in Italy, across the scenarios proposed by the EC Commission (2004), both on the tobacco production and processing sector. The considered socio-economic indicators are harvested surfaces, farm income and overall employment, while the sample of farms used in this research belong to the FADN–Italy sample.

Keywords: Tobacco CMO, CAP reform, decoupling, Positive Mathematical Programming.

JEL: Q11, Q12, Q18, J21

1. Introduction

In the last three years the mechanisms of the agricultural policy have encountered a deeper evolution as consequence of the discussion around the international markets concerns, the strong demand from the consumers for a better use of public funds in the agricultural sector and in response to the EU's budget constraints. The Reg. 1782/2003, the fundamental document containing the new measures on which the direct aid to the European farms is based, introduces the decoupling as the principle by which all the CMO revisions have to be characterized. Although, this document concerns only the first step of the revision of the CAP, in particular the measures related to the arable crops and to the animal processes. Starting from this point, the discussion was extended to the other CMO's, in order to define a new aid system inspired to the decoupling principle. In this context, the revision of tobacco CMO is integrated in the reform of the Mediterranean products (olive oil, cotton and hops) and it has seen some specific adjustments during the period 2002-2004. The revision process of the tobacco CMO is characterized by the objective to reduce the production of a crop engendering injurious to the health as a response to the society demand. This kind of result will be obtained throughout decoupling all the direct aids. This mechanism will permits to achieve the policy objective of the reform and, at the same time, will maintain a stability in the farm revenue, overall for the farms specialized on this production. As the direct aid on tobacco are very high respect to the other crops, the decoupling process for this CMO may have strong effect on the farmers production plans, that is a partial or total conversion of the tobacco harvested area in other crops with specific costs lower than the cost sustained to produce tobacco.

In view of this complex modification of the scenario of the tobacco production, the present paper aims to provide some considerations supported by the results obtained by a farm model based on the Positive Mathematical Programming (PMP) approach. In particular, the analysis will focus on the effect of the reform proposal of April 2004 at production level, on the specialized tobacco farms, and on the impact of the new production organisation of the farms respect to the demand of labour at farm level and in the tobacco industry processing. In fact, the perspective of an important abandonment of this kind of production have to be evaluated to understand the consequences on the socio-economic point of view and in more specific manner on the sector employment.

The PMP methodology applied to this prediction analysis permits to capture the farm behaviour of the specialized tobacco farms in such a way that, via the estimation of the marginal costs associated to each farm processes, one can assess the variation of the production plan of each considered farm. Some specific policy scenarios will be formulated and applied at farm level to have the reaction of the

decision about the land allocation respect to the introduction of the new tobacco reform. For this issue, the analysis keep in account the Italian tobacco specialized farms identified in the national FADN-Italy archive.

2. The production of tobacco in Italy

Compared to the total European production of almost 340,500 tons in 2001, the overall quantity of raw tobacco harvested in Italy is stable at around 129,000 tons (approximately 38% of the European total), involving an area of little more than 39,000 hectares. It should be noted that the top three producing countries (Italy, Greece and Spain), represent alone almost 90% of the area grown and the total tobacco production in the EU. Italian production is limited to the maximum guaranteed quantity allocated to Italy that amounts to around 131,965 tons.

The crop area dedicated to tobacco has a very peculiar geographical distribution: in only four regions (Campania, Veneto, Umbria and Puglia) almost 90% of the total production can be found, with more than 85% of the total tobacco areas. In particular, six provinces along cover almost 80% of the national production: Perugia (20.2%), Benevento (16.3%), Verona (14.5%), Caserta (12.2%), Avellino (7.0%) and Lecce (8.1%).

There are however very strong structural differences: for example, in Puglia, with almost 3,000 farms, just under 2,000 hectares are cultivated, with an average farm investment of less than a hectare. A similar situation can be found in Campania, while the average increases to 12 hectares in Umbria and 9 hectares in Veneto (table 1). This territorial concentration runs alongside a production concentration, which can be seen from the analysis of the distribution of quotas per farm. On average, for each farm, in Italy 4.88 tons of production quotas are allocated, compared to the EU average level of only 3.35 t/farm (Sorrentino et al., 2003).

Table 1. Number of tobacco farms, total area grown and average area grown per farm and per province (year 2000).

Province	Number of farms	Area grown (ha)	Average area grown per farm (ha)
Caserta	2,482	2,870.9	1.16
Benevento	4,719	6,388.5	1.35
Naples	422	364.2	0.86
Avellino	2,960	2,745.8	0.93
Salerno	579	268.5	0.46
CAMPANIA	11,162	12,637.9	1.13
Perugia	699	8,304.6	11.88
Terni	15	262.7	17.51
UMBRIA	714	8,567.3	12.00
Verona	172	5,683.7	33.04
Vicenza	190	553.2	2.91
Treviso	31	116.4	3.75
Venice	129	124.3	0.96
Padua	246	457.5	1.86
Rovigo	1	0.3	0.30
VENETO	769	6,935.4	9.02
Foggia	45	43.0	0.96
Bari	56	99.5	1.78
Brindisi	7	45.0	6.43
Lecce	2,344	1,763.6	0.75
APULIA	2,452	1,951.0	0.80

Source: Internally using ISTAT data, 2000.

The territorial differentiation is also very noticeable for the varieties cultivated. In fact, table 2 shows how the production of tobacco in Group I (mainly Bright) is concentrated in two regions:

Umbria and Veneto. In the same way, in Campania there is more than 90% of the production of the varieties in groups II and III, while in Puglia 90% of the Levantine tobacco of Group V is grown. More than 70% of the tobacco varieties of Group IV (Kentucky) is concentrated in Campania and Tuscany.

Table 2. Production per variety group and per region, year 2001 (t).

Group	Campania	Umbria	Veneto	Puglia	Other	Total
I. Flue cured	63.8	23,151.3	16,977.1	573.1	8,112.3	48,877.6
II. Light air cured	45,630.4	9.1	1,932.2	198.3	2,427.8	50,197.8
III. Dark air cured	15,429.0	0.0	7.5	187.2	938.8	16,562.5
IV. Fire cured	2,287.2	364.4	696.1	0.0	2,937.3	6,285.0
V. Sun cured	78.3	0.0	0.0	6,484.3	594.4	7,157.0
VII. Katerini	0.0	0.0	0.0	78.4	20.0	98.4
Production Total	63,488.7	23,524.8	19,612.9	7,521.3	15,030.6	129,178.3
Average yields	4.08	2.79	2.87	2.46	2.83	3.30
FTEW Total	8,551.1	2,669.9	1,865.2	1,136.0	2,099.3	16,321.5

Source: Assotabacco, 2003.

According to the above, we can state that Bright tobacco (Group I) is cultivated using a more industrial approach, as the average area dedicated to this crop variety reaches almost 30 hectares in Veneto, while the cultivation of the oriental varieties (Group V), typical of Puglia, and Burley (Group II), practised in Campania, involve a higher number of small farms that, on average, dedicate less than one hectare of AAU to this variety.

The average subsidy can also be noted for each region, calculated as the ratio between the total subsidies and the total regional production. This value represents the weighted average of subsidies, according to the varieties of tobacco produced in each region. In other words, we can state that regions such as Umbria and Veneto receive on average a higher subsidy than Puglia and Campania. This is due to the concentration of the production of varieties in Group I in the former regions, which benefit from a higher subsidy compared to the varieties in the other groups.

Finally, we also need to remember that tobacco farming also has important repercussions within the national agricultural panorama, as it is very labour-intensive, requiring in man-hours terms from 4,000 hours/ha to 1,000 hours/ha. Overall, it is estimated that approximately 16,300 “full time equivalent workers” (FTEW) are involved in tobacco farming, most of them obviously also concentrated in the four above-mentioned regions.

In addition to these figures, we obviously also need to consider the workers “downstream” of the supply chain, as the tobacco crop triggers the later phases of tobacco transformation and connected goods and services production activities. In particular, the first transformation is the second phase of the tobacco processing chain, prior to the preparation of the final product destined for consumption.

This industry, which is generally carried out in areas adjacent to the raw tobacco harvest, lead to the creation of “tobacco districts”, which in the last three decades have undergone restructuring, with a drastic reduction in the number of companies. While at the beginning of the 1970s there were more than 1,200 first transformation plants across the national territory, the progressive expulsion of the smaller companies has led to the current situation, where there are only 59 companies in the whole of the country (Nomisma, 2002). At the same time, this sectoral reorganisation has led to the growth in average transformed tobacco volumes per company.

These considerations allow us to state that the possible introduction of modifications to the current CMO to reduce or de-incentivate the tobacco industry could have very severe consequences on the local economic systems, both in terms of income and in terms of employment.

3. The Tobacco CMO

The tobacco CMO is at the centre of a heated debate between the upholders of the importance of the European tobacco industry and those who are against providing support to a crop whose transformed product is dangerous to the health. Over the years it has seen two Reforms (in 1992 and 1998) and one revision in 2002 continued up-to 2004. In particular, the main objective of the 1992

Reform was to reduce the cost of the aid to this sector, at the same time limiting the risks of fraud. This first Reform, introduced by the EC Regulation n. 2075/92, foresaw the abolition of the intervention and the return to exportation, as well as the introduction of a regime of production quotas (still in force) and a number of measures to simplify the regime and strengthen the controls.

Behind the 1998 Reform on the other hand is the realisation of the existence of an unbalanced supply and demand, caused mostly by the low quality of EU production. In fact, the purchase price of raw tobacco, which may be considered the best indicator of quality, was on average in 1995 only 20% of the paid subsidies. This bad quality production found most of its markets outside of Europe (EU Commission, 2002).

The 1998 Reform substantially modifies the tobacco CMO functions. In force from the harvest of 1999 onwards, it basically aims to provide incentives for a better quality tobacco production, through the modulation of aid according to purchase price, and to improve the attention to public health and respect for the environment, promoting the re-conversion of producers who decide to leave the sector and abandon the production of tobacco. Moreover, it simplified the administrative management, making the quota regime more streamlined and strengthening the controls, thus reinforcing the efforts made in 1992.

The current tobacco CMO, based on the 1992 Regulation, involves a regime of subsidies, a regime of production limitation, a series of measures aiming to orient production and a regime of exchange with third countries. Table 1 shows the classification in eight variety groups of raw tobacco, as shown in the annex to the EC Regulation n. 2075/92.

The first tool to be considered is the regime of subsidies, established to contribute to the producers' income, in the framework of a production that corresponds to the real needs of the market.

The subsidy includes:

- **a fixed part**, paid to the producers' association, which re-distributes it to each association member, or to each single producer who is not a member of the association;
- **a variable part**, introduced in 1998, paid to the producers' association, which re-distributes it to each association member, according to the purchase price paid by the first transformation company to purchase the respective individual crop production;
- **specific aid**, agreed with the producers' association, of no more than 2% of the subsidy.

Furthermore, it has been established that the amount of the subsidy is the same for all tobacco varieties that belong to the same group. An extra amount is granted to certain tobacco variety groups in Belgium, Germany, France and Austria.

Through this system, the aim is to modulate the subsidies given to the producer according to product quality. This is possible due to the fact that the variable part, constituted of a quota of between 30% and 45% of the total value of the subsidy itself, is linked to the raw tobacco purchase price, which is considered an objective index of production quality. In this way the social function of the aid (to support the tobacco growers' income) is combined with the economic function (to promote a quality production suited to the demands of the internal market).

Receiving the subsidy, the tobacco producer is subject to a number of conditions, including the obligation for the tobacco to come from a specific production zone according to each variety, the presence of quality requirements and the supply of leaf tobacco by the producer to the first transformation company according to a crop contract.

The crop contract, signed by the first transformation company and the producers' association or by a single producer who does not belong to an association, is the basis for the payment of the subsidy. EC Reg. no. 546/02 also introduces the possibility for the Member State, when justified by structure, to apply an auction sale system for the crop contracts to the producers' associations who wish to participate.

Finally, EC Reg. no. 1636/98 establishes that, as a transitory measure for the harvests of 1999 and 2000, the subsidy could be paid through the first transformation company.

The raw tobacco sector is linked to a production limitation system, set out on three levels:

- the first level is a maximum global guarantee limit of the EC production;
- the second level includes specific three year guarantee thresholds for each Member State and variety group;
- the third level introduces a regime of individual production quotas, by variety group, divided among the single producers.

One objective set in the 1992 Reform, still in force today, was the orientation towards quality production. In the aims of the EC legislators, this is done using three tools: the specific aid offered to the producers' associations, the EC tobacco research and information fund and the programme for buying back quotas.

The specific aid, foreseen in the regime of subsidies, is paid to the producers' association to improve the respect for the environment, to provide incentives for production quality, to consolidate the management and guarantee the respect of the EC regulations within the association.

It is well-known that the recent European debate on CMO Tobacco is argued a) on a moral issue about supporting a product injurious to health, b) on production quality and c) on incidence of this supply-chain in the European economic system. Arguments deeply related each other.

The incidence of tobacco sector on national economy was particularly binding Government position in the debate. During the Council of European Union meeting held in Brussels in April 2004, Italian Minister of Agriculture has tried to change the previous proposal of aids modulation through 3 classes and has promoted a new subsidies plan. This will apply full decoupled payments in 2010, after a transitional period (2006-2010) while decoupling rate will be set not lower than 40% of reference amount of tobacco. Moreover, the coupled part of payments will be tied to certain qualitative level and to the location of the producer, which must be one of the Objective 1 regions.

This plan has only temporary significance. From 2010 all subsidies will be decoupled, according to a program for which 50% of aid will be into Single Payment Scheme (SPS) and remaining 50% will finance a restructuring fund. A sum equal to 4%, for 2006, and 5%, for 2007, of aid must be devolved to the Community Tobacco Fund.

4. The impact analysis of Tobacco CMO Reform by farm model

The analysis of the Reform proposal developed in April 2004 is carried out focusing on specialised tobacco farms in the four Italian regions with the highest regional cultivation of tobacco: Campania, Umbria, Veneto and Puglia. The sample of farms used in this research belong to the FADN – Italy sample and allow for a good statistical representation of the land use and the economic and production performance of these farms in their production context (Table 3).

Table 3. Characteristics of the FADN sample – Italy

Region	Number of farms	Tobacco area /AAU (%)	Average AAU per farm	Average tobacco area per farm
Puglia	12	43,0	11,1	4,8
Campania	99	22,7	7,8	1,8
Umbria	68	37,7	31,2	11,8
Veneto	24	27,2	14,4	3,9
Total	203	33,4	16,6	5,6

Source: Internal using INEA-RICA data

The methodology used to simulate the effects of the Reform scenarios on the sample of RICA-Italy farms is the Positive Mathematical Programming (Howitt, 1995; Paris et Howitt 1998; Paris et Arfini, 2001). PMP is well known approach and it is used to reproduce the economic and production framework of the farms present within the sample group, and to estimate the future production choices, based on the changes in economic convenience of tobacco crops with respect to the possible alternative production activities within the farm, as a result of variations in price, subsidies and payment methods (coupled decoupled). At the same time, the RICA-Italy sample allows us to concentrate the analysis on farms specialising in tobacco crops, and to distinguish them according to the production territory.

In the original formula put forward by Paris and Arfini (1995), the method was based on a three-phase procedure the main parts of which are summarised below:

1. Estimation of marginal costs for the processes implemented. The aim of this phase is to recover some of the information regarding specific production costs the farmer uses to

formulate the farm production plan, through the estimation of marginal costs linked to the production processes implemented on the farm.

2. Estimation of the cost function. In the second phase, the PMP estimates a squared cost function able to provide a better representation of production costs, the farm cost function, which is more coherent with economic theory. The method of estimation used in this phase is based on maximum entropy.
3. Calibration of the model vs. the year of observation. In this phase, the economic-production situation observed is reproduced using only the information on production costs estimated during the previous phase. At this point the model can simulate the effects the main changes in agricultural policy will have

The model created for the analysis of tobacco policy follows to the procedure described, integrated with specific constraints and conditions of the support new instruments introduced by the new CAP Reform contained in the horizontal regulation 1782/2003 and the regulation of the olive oil, tobacco, hops and cotton sectors proposed by the Council of Ministers in April 2004.

4.1 The estimation of marginal costs for the processes implemented

The model can be defined as a farm model for this sector, since the analysis was carried out on a farm-wide basis and only for tobacco-growing farms.

The model was built only on the basis of crop structure, thus neglecting the zoo-technical component and production reuse within the farm. As far as the crops are concerned, reference has been made to annual production only and not to permanent tree production. The model was therefore built only using crops grown in farms producing tobacco. For each of these, an objective function was defined on the order of:

$$(1) \quad \max_{x_v^n} RL = \sum_{v=1}^V [x_v^n (pr_v^n - c_v^n)] + \sum_{v=1}^V xh_v^n sh_v^n$$

where x_v^n is the production level for each plant process, $v=(1, \dots, V)$, of each farm in the sample, $n=(1, \dots, N)$, while pr_v^n e c_v^n are, respectively, the price and the cost associated with each product level. The objective function takes into consideration the amounts of farm aid — defined as the product of between the growing area, xh_v^n , and the per hectare aid level, sh_v^n — as part of the farm's gross earnings (RL). The objective function specified in (1) is subject to a series of constraints that can be expressed as:

$$(2) \quad \sum_{v=1}^V (a_v^n x_v^n) \leq b^n$$

$$(3) \quad x_v^n \leq \bar{x}_v^n + \varepsilon$$

$$(4) \quad x_v^n \geq 0$$

where a_v^n is the element of the matrix of crop technical processes implemented by each of the n farms in the sample. The constraint in equation (2) indicates the overall availability of scarce factors to be allocated among the various production processes V . In the present model the limiting factor is only the land to be used for the various production processes. Constraint (3), on the other hand, concerns the production capacity of each crop grown on the farm, defined according to the levels of production observed. (4) presents the known non-negativity constraint placed on the primary variables for the problem. The problem of linear programming (1)-(4) uses the calibration constraints to reconstruct the situation observed, restoring the dual values associated with the production capacity constraints in (3), λ_v^n . This initial phase, therefore, serves to derive the dual variables specific to the production processes used on the farm. This information incorporates the technical and economic elements the farmer considers in defining the farm production plan.

4.2 Estimation of the cost function

The objective of the second phase of the PMP procedure is to estimate the farm cost function. Starting from the vector of the shadow prices associated with the calibration constraints, we can determine a new cost function that meets both the criteria defined by economic theory of production costs and farm reality. To meet the non-linearity condition for the objective function of the third phase, a quadratic functional shape has been chosen (Howitt, 1995). Starting from the information on the problem of linear programming it is, therefore, possible to build a new quadratic cost function defined as follows:

$$(5) \quad (\lambda + c)\bar{x} = \frac{1}{2}\bar{x}'Q\bar{x}$$

where λ and c are, respectively, the vector of the dual values that determine the first phase and the vector of the accounting costs drawn from the national FADN-Italy data bank, \bar{x} is the vector of the known production levels and Q the matrix of the non linear function of total costs. In (5) the elements for matrix Q are still unknown and must be derived through suitable estimation methods. In the literature (see Paris et al., 2000) estimation through application of the principle maximum entropy is preferred. This estimation method is implemented in this framework to derive the unknown elements of the matrix Q .

4.3 The model for policy analysis

The information on production costs derived from the first and second phases of the procedure is introduced in a new model in order to reproduce the starting situation, even without the positive constraints, as these are implicit in the objective function. At this point, the model can be used to evaluate the effects of a change in some of the parameters of the problem such as prices and levels of aid, development in the political and/or market scenarios.

The model of the third phase must, therefore, consider the constraints placed by the system of Community aid. The first constraint drawn from the first phase refers to the use of the land factor, the only constraint on the farm production resources. As opposed to the constraint expressed in (2), in the third phase farms can use the land to grow crops or alternately it can be invested in area laid fallow, in compliance with the horizontal regulations applied by the Mid Term Review. For this reason, the structural constraint placed on the farm is modified:

$$(6) \quad \sum_{v=1}^V (a_v^n x_v^n) + gap \leq b^n$$

where gap indicates the variable associated with the surfaces under production according to the codes of good agricultural practice. In the present model, set-aside is not considered as a variable.

Furthermore, in order to implement the simulation model, the two main elements of the Mid Term Review were also presented: the principle of decoupling aid and the modulation procedure.

For the decoupling, some constraints define the allocation method for the rights to aid called for in Reg. 1782/2003, according to which it is possible to cash in on the rights accrued only if they are used in relation to admissible land areas. It should be noted that the regulations for implementation consider admissible land areas as all farm land with the exception of that planted with permanent crops, but including meadows and pasture areas, and the production covered by the fruit and vegetable CMO. According to these rules, the constraints formulated by decoupling are as follows:

$$(7) \quad xha^n \leq \overline{xhrif}^n$$

$$(8) \quad xha^n + xhad^n = \sum_{amm(v)} \{xh_v^n + gap^n\}$$

where in (7) xha^n and \overline{xhrif}^n are, respectively, the admissible area used for right to aid purposes and the number of rights calculated according to the reference land area to calculate the unit value for the rights. On the other hand, (8) sets the relation between the overall admissible area for aid, $(xha^n + xhad^n)$, where $xhad^n$ is that part of the admissible area outside the number of usable rights, and the sum of the land area variables corresponding to the processes admissible for aid.

As far as aid modulation is concerned, the model reduces the overall amount of the aid by a percentage which, when fully operative, is 5%, but applied only to that portion that exceeds 5,000 euro. This is applied in order to take into consideration the so-called exemption. Based on these rules, the relations formulated in the model are:

$$(9) \quad \sum_{v=1}^V (xh_v^n sh_v^n) + (xha^n vdir^n) = Aaid^n + Baid^n$$

$$(10) \quad (Baid^n 0.05) \leq rdm^n$$

where, $vdir^n$ is the value of the rights for the n -th farm in the sample, while $Aaid^n$ and $Baid^n$ are, respectively, the portion of the aid for the first 5,000 euro and the share in excess of the exemption. The constraint $Aaid \leq 5,000$ must be defined for $Aaid^n$. Relation (10) contains the calculation of the reduction in aid, rdm^n , to be applied for farms considering the exemption of 5,000 euro.

The model specified with the above-mentioned constraints is implemented to simulate the agricultural policy scenarios in the aim of maximizing an objective function where the maximization is performed on the gross margin of each farm in the sample. ML^n , defined as the sum of the positive and negative earnings components.

$$(11) \quad \begin{aligned} \max \quad ML^n &= \sum_{v=1}^V (x_v^n pr_v^n) + \sum_{v=1}^V (xha_v^n sh_v^n) \\ &+ (x_{tab1}^n sh_{tab1}^n + x_{tab2}^n sh_{tab2}^n + x_{tab3}^n sh_{tab3}^n) \\ &+ (xha^n vdir^n) \\ &- rdm^n \\ &- (gap^n cgap^n) \\ &- \sum_{v=1}^V \sum_{v'=1}^V \{x_v^n q_{vv'} x_{v'}^n\} \frac{1}{2} - \sum_{v=1}^V \{u_v^n x_v^n\} \end{aligned}$$

The aid for tobacco has been considered in a differentiated manner according to the production interval. In this way, it is possible to assign tobacco production variable aid quotas coupled as a function of the phase of application of the new CMO. The objective function considers the reduction in aids applied to the n -th farm, rdm^n , and the costs associated with the cultivated area according to the codes of good agricultural practice, $cgap^n$.

The total variable costs for the production process is as estimated in the previous phase of the PMP procedure; not only does it integrate the sample costs but also the residual error compared to the threshold cost function for each farm.

5. Impact of the Tobacco CMO Reform at farm an territorial level

Following the elements contained in the Proposal reform for tobacco raw, the assessment of the impact of this Reform will be carried out on the basis of two scenarios that are as far as possible representative of those attainable from the last European Union Council. The following tables show

the variations of economic variables and production activities depending on the considered subsidies plan:

- Scenario A. This scenario correspond the “transition phase”. This policy considered as production decoupled aid in the measure of 40% of the ceiling, remaining resources (60%) will be allocated through a production coupled aid;
- Scenario B. This scenario correspond to the “full implementation” of the Reform, where a production decoupled payment in the measure of 50% of the ceiling, remaining resources will finance a tobacco funds (in order to help tobacco farms conversion in other activities);
- Scenario C. This scenario is an option of scenario B and concern full implementation with full decoupled payment in the measure of 100% of the ceiling;

As before, the analyses will cover issues concerning supply variation, production farm organisation and effects on farm income. These considerations will be carried out on an aggregate level and, in addition, examining the results of the four most representative tobacco producing regions.

Before analysing the results obtained by the simulation of the different scenarios, we need to note how the model makes its own evaluations based on the economic advantage of the individual processes, therefore bearing in mind the technology used, the level of prices and subsidies received, as well as the level of costs upheld for each production process. In the case of tobacco producers, these variables must be evaluated carefully, as these are dependent for the future results expressed by the model in reproducing the possible strategic choices to be made as the agricultural policy scenarios variations.

5.1 The variation in tobacco supply

The scenarios examined would have significant effects on tobacco cultivation in Italy and cause a drastic reduction in the overall production of tobacco in all farms in the FADN sample, leading to the complete disappearance of some production realities. The variable who better make clear the impact of the April 2004 Reform proposal is the reduction of the number of tobacco hectares. This value highlights the loss of competitiveness of this crop and of the chain linked to tobacco transformation even under this new policy scenario (Table 4).

Considering the four regions together (Campania, Umbria, Puglia and Veneto) the production of tobacco drop only by 53% in transition phase (Scenario A) which ensures at least 60% of production coupled, but fall to more than 95% in the second and third scenario (Scenario B and Scenario C) where the subsidies are decreased by 50% and are totally decoupled.

Tobacco Reform impact and the effects of the Mid Term Review will induce a deeper farm production re-organization. Over the first phase of the Reform (Scenario A), actually, COP production will be reduced of 30% in all, against a noteworthy fodder production growth, as well as sugar beets and no cultivated surface .

In the scenario assuming the full implementation of the Reform (Scenario B and C) and, thus, an aids reduction, it can be noticed a slight arable crops COP return, with particular reference to maize and durum wheat. This last consequence is mainly caused by the cancellation of coupled payment simultaneously with the subsidy volume cutting. Those element force farmers in looking for others production alternative.

Table 4. Variation in production per process compared to Baseline - Italy

Process	Baseline	Scen_A	Scen_B	Scen_C	Scen_A	Scen_B	Scen_C
	(Valori assoluti in Ha)				(Var. %)		
COP crops	1.728	1.192	1.439	1.439	-31,00	-16,70	-16,70
<i>Wheat and other cereals</i>	1318,00	894,00	1030,00	1030,00	-32,20	-21,80	-21,80
<i>Maize</i>	353,00	173,00	222,00	222,00	-50,90	-37,20	-37,20
<i>Oilseeds</i>	33,00	123,00	186,00	186,00	274,80	466,00	466,00
<i>Protein crops</i>	25,00	2,00	2,00	2,00	-93,50	-93,50	-93,50
Others eligible crops	1573,00	2077,00	1830,00	1832,00	32,00	16,40	16,50
<i>Sugar beet</i>	172,00	218,00	214,00	214,00	26,70	24,70	24,70
<i>Fodder</i>	342,00	1114,00	1145,00	1152,00	226,20	235,20	237,10
<i>Rice</i>	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Tobacco	1060,00	497,00	32,00	33,00	-53,10	-97,00	-96,90
<i>Non cultivated acreage</i>	0,00	248,00	439,00	433,00	100,00	177,00	174,40
Non eligible crops	67,00	100,00	99,00	97,00	48,50	46,80	44,60
COP crops	3.368	3.368	3.368	3.368	0	0	0

Source: Internal

From an economic point of view, (Table 5) farms will be able to face a strong Gross Production reduction (-20%) with a deep net income improvement (127% in Scenario A and 280% in Scenario C). These results are reached, thank to gains induced by fodder and good practice exploitation, despite the subsidies fall planned in the agreement of April.

In detail, in Veneto and in Umbria, tobacco growing will remain only if a couple aid of 60% will be kept (Scenario A), otherwise, a fully decoupled subsidy plan will induce a total abandon. The re-organization process will see tobacco substituted by Maize (in Veneto), by Oilseeds (in Umbria), by sugar beets (in both regions) and, above all, by fodder growing and free land kept in accordance with good agricultural or environmental practice.

The substitution process, in those region, will bring a deep Gross Revenue increase simultaneously to a Gross Production drop. In Veneto, in the period of full application of the new regulation (Scenario A), the Gross Margin will raise of around 55% and, in Umbria, of more than 200%. This growth is induced by decoupled payments and by the possibility of having recourse to a extensive productions, as fodder plants and no cultivated surface, those cut production costs.

In the southern regions, even in the presence of disadvantaging scenario, Scenario B and C, tobacco crop do not disappear. In Puglia, in those scenario, tobacco should decrease of around 80% and, in Campania, of around 90%.

Given the strong reduction of the planting, it can be observed a much more intense production re-organization than in the northern regions. In details, in Puglia there will be an important growth of COP crops (36%) and, among those, durum wheat. Those crops will decrease in Campania (-53%) leaving place to fodders and non cultivated surfaces.

Table 5. Variation of the most important economic parameters per region– Italy

Economic variables	Baseline	Scen. A	Scen. B	Scen. C	Scen. A	Scen. B	Scen. C
	(.000 Euro)				(Var. %)		
GSP	3.308	3.025	2.638	2.622	-8,6	-20,3	-20,8
Direct Payments:							
<i>Gross</i>	8.908	7.719	4.932	9.313	-13,3	-44,6	4,5
<i>Modulated</i>	0	336	199	416			
<i>Net</i>	8.908	7.383	4.733	8.897	-17,1	-46,9	-0,1
Production costs	9.510	4.709	1.222	1.212	-50,5	-87,2	-87,3
Gross margin	2.706	5.699	6.149	10.307	110,6	127,2	280,9

Source: Internal

From an economic point of view, the impact of both Reforms (tobacco and COP) could be really different among the two southern regions. In Puglia, starting the most damaging scenario for tobacco

(Scenario A) will bring a gross margin increase of 16,5%. In Campania this gain will be wider, around 64% more than current situation.

The decoupled aid under all scenario hypothesis does not justify the continuation of the tobacco cultivation for many producers. This would translate into the strong reduction (until the total abandon) of the tobacco crop and thus the corresponding reduction of direct aids; in the meantime, also the decoupled aid received would be very low, while the contribution to the tobacco fund will increase consistently.

Scenarios structured on April hypotheses show clearly how the Single Payment System push to “market effect” substituting tobacco with more profitable crops. At the same time farm income increase moving from scenario A to scenario B (much more decoupled). Even if such a kind of consequence is predictable, in theory, and verified through empirical analysis by the model, in Puglia and Campania doesn’t happen due the less flexibility of the farm, the higher production costs structure and difficulty to introduce new crops.

6. Occupational considerations

According to the report prepared by the Equal Project (2002) working group, during the year 2002, over 125,000 workers were employed throughout the entire tobacco agro-industrial processing chain, comprised of the agricultural segment and the processing segment strictly connected to the base production phase. Of these, approximately 6,000 were directly employed in the processing phase and just under 2,000 in various chain-related activities (shipping, handling, services, etc.), while in the agricultural segment, approximately 119,000 were employed in tobacco cultivation.

Full-time agricultural phase employees, comprised almost exclusively of independent farmers and their families, were estimated to number around 62,550 units (52.4% of the total). The remaining 47.6% (56,799 units) were seasonal employees.

In general, it could be stated that the agricultural component of the tobacco processing chain is characterised by the use of temporary labour (the number of employees hired on a permanent basis is marginal). This factor is the reason behind recourse to the labour market on the basis of seasonal peaks in manpower demand, primarily during the months from June to October during transplantation and harvest periods.

In analysing regional data, it can be seen that the employment structure is closely tied to the type of farm prevalent in each region. In areas such as Campania and Puglia with high numbers of small farms, less use is made of extra-family labour in tobacco cultivation compared with the work performed by the farmer and his family. Viceversa, in Umbria and Veneto where medium-to-large farms have a strong presence, there is a significant presence of seasonal workers and, generally, a net prevalence of extra-family labour.

The data collected from the 8th Italian Census of Industry and Services (Istat, 2001), clearly show a contraction of the Italian tobacco industry. Over the last ten years, the number of tobacco processing plants has been reduced by approximately 35%, while the number of employees has been more than halved in the same period. According to Census data, in 2001 the number of employees in the tobacco industry are approximately 7,800 and the production plants 169. The average data per production unit has decreased in the considered period, passing from 69 employees per plant in 1991 to 46 in 2001.

The high concentration of the tobacco industry is revealed by the regional data, where it can be seen that, in 1991, in the first seven regions (Campania, Puglia, Tuscany, Lazio, Emilia-Romagna, Umbria and Veneto) were located approximately 80% of the total number of production plants and 77% of the total number of workers. The concentration process is continued over the last ten years, since in 2001 the quota of plants and employees located in those regions is raised to 88% and 84%, respectively. It is also interesting to notice that those regions are all interested by agricultural phase of tobacco production, showing a clear relation between the agricultural and the processing stage.

Table 6. Italian tobacco industry: plants and employees, years 1991 and 2001

Region	Plants 1991	Plants 2001	Var %	Employees 1991	Employees 2001	Var %	Employees per plant 1991	Employees per plant 2001
Campania	48	32	-33	3,012	1,896	-37	63	59
Puglia	52	29	-44	3,577	1,418	-60	69	49
Tuscany	19	12	-37	1,653	889	-46	87	74
Lazio	14	18	29	1,365	690	-49	98	38
Emilia-Romagna	6	4	-33	1,135	647	-43	189	162
Umbria	54	46	-15	1,908	532	-72	35	12
Veneto	16	8	-50	1,004	508	-49	63	64
Marche	4	1	-75	677	312	-54	169	312
Sicily	4	3	-25	532	296	-44	133	99
Trentino-Alto Adige	2	1	-50	509	261	-49	255	261
Sardinia	2	1	-50	264	175	-34	132	175
Calabria	4	2	-50	137	113	-18	34	57
Abruzzo	15	5	-67	703	43	-94	47	9
Liguria	1	1	0	29	34	17	29	34
Friuli-Venezia Giulia	5	1	-80	355	9	-97	71	9
Piemonte	6	2	-67	379	7	-98	63	4
Lombardia	3	1	-67	377	2	-99	126	2
Basilicata	1	2	100	9	2	-78	9	1
Italy	256	169	-34	17,625	7,834	-56	69	46

Source: Istat (2001).

It was seen earlier that the scenarios examined produce a drastic reduction in tobacco cultivation in all regions under consideration. It is clear that this reduction will have serious consequences on employment across the entire tobacco chain and its related activities.

The major effects will be felt in the agricultural production and in the next processing phase since, as stated previously, although in the process of undergoing modernization, the tobacco sector is still one of those with the highest manpower demand in the agri-food sector (Equal Project, 2002).

To evaluate the effects of the scenarios on tobacco sector employment, the labour required to obtain a ton of product was first calculated for each region. Then, keeping constant the labour requirement figures thus obtained and applying the percentage variations in tobacco supply (Table 15), it was possible to estimate the number of workers that would remain employed in the tobacco production and processing phase, following the scenarios described.

It can be seen that in each region there is a considerable reduction in the number of employees in the agricultural phase of tobacco production compared with the base situation. However, this reduction differs among regions and scenarios.

In table 7, the negative effects are higher in the Campania region where, out of its total agricultural labour force (over 750,000), those employed in tobacco farms drop from 10% in the base situation to 6% in the most favourable scenario, reaching less than one unit in all other scenarios. The situation is different in Puglia where, although there is a noticeable reduction in employees in all scenarios (ranging from 12 to 20 thousand fewer workers), the overall impact of the change in these workers in relation to all agricultural workers is fairly modest (ranging from 1.7% in the base situation to a percentage level that varies from 0.04% to 0.65%). The same is true for Veneto (0.8% in the base situation to percentages that vary from 0.1% to 0.6%), while in Umbria the relative impact of tobacco farm employees on the total increases in one scenario (from 3.3% to 3.4%) and is cancelled out or considerably reduced in the others.

The tobacco production disappears in Veneto and Umbria in both Scenario B and Scenario C, while in the Scenario A the relative importance of tobacco employment on the total agricultural employment decreases from 0.8% to 0.5% and from 3.3% to 1.5%, respectively in Veneto and Umbria.

In the Puglia region the tobacco labour force drops from 20 thousand in the base to approx. 14 thousand in Scenario A and less than 5 thousand in Scenario B and Scenario C. However, the relative

importance of this sector on the total agricultural occupation is still low, decreasing from 1.7% of the base to 1.1% of Scenario A and to 0.3% of Scenario B and Scenario C.

Table 7. Number of workers in tobacco farming, per scenario and labour category.

Regions	Scenarios	Family labour			Extra-family labour			Total employment
		Farmers	Family workers	Total	Permanent workers	Seasonal workers	Total	
Campania	<i>Base</i>	17,684	24,505	42,189	46	35,892	35,938	78,127
	Scenario A	8,486	11,760	20,246	22	17,224	17,246	37,493
	Scenario B	2,281	3,160	5,441	6	4,629	4,635	10,076
	Scenario C	2,281	3,160	5,441	6	4,629	4,635	10,076
Umbria	<i>Base</i>	760	1,062	1,822	258	3,650	3,908	5,730
	Scenario A	331	463	794	112	1,591	1,703	2,497
	Scenario B	0	0	0	0	0	0	0
	Scenario C	0	0	0	0	0	0	0
Veneto	<i>Base</i>	822	1,138	1,960	230	2,793	3,023	4,983
	Scenario A	483	668	1,151	135	1,641	1,776	2,927
	Scenario B	0	0	0	0	0	0	0
	Scenario C	0	0	0	0	0	0	0
Puglia	<i>Base</i>	5,331	5,384	10,715	6	10,092	10,098	20,813
	Scenario A	3,576	3,612	7,188	4	6,770	6,774	13,963
	Scenario B	1,158	1,170	2,328	1	2,193	2,194	4,523
	Scenario C	1,021	1,031	2,053	1	1,933	1,934	3,987

Source: Internal.

If we look at employment categories, it is logical to assume that the effects of the scenarios on occupation will be different according to whether family or extra-family labour is considered. Presumably, the farmer will modify the productive structure of his farm to bring it into line with market demand. It is plausible that the workers from the farmer's family will continue to work on the farm in different activities or, in the case of young workers, will look for employment outside the family farm. On the other hand, extra-family employees will be those most seriously hit by these changes. These people, especially the numerous immigrants employed in the sector, will have serious difficulty finding employment within the farms under study.

Table 8. Number of workers in tobacco processing industry, per scenario and labour category.

Regions	Scenarios	Permanent workers	Temporary workers	Casual workers	Total employment
Campania	<i>Base</i>	210	1,026	14	1,250
	Scenario A	101	492	7	600
	Scenario B	27	132	2	161
	Scenario C	27	132	2	161
Umbria	<i>Base</i>	68	803	0	871
	Scenario A	30	350	0	380
	Scenario B	0	0	0	0
	Scenario C	0	0	0	0
Veneto	<i>Base</i>	22	360	3	385
	Scenario A	13	211	2	226
	Scenario B	0	0	0	0
	Scenario C	0	0	0	0

Source: Internal.

In the processing phase, a drastic reduction in employees can be seen, especially in Campania and Umbria, those regions that currently have the highest number of employees in this sector. The data in table 7 confirms that the tobacco districts of Campania and Umbria would be the ones most hit by changes in EC policy, while in table 8 the more dramatic effects are felt by Umbria and Veneto where, in two scenarios out of three, the employment in the tobacco industry completely disappear. The effects of these policies, immediately felt in the agricultural production phase, would also be reflected

in the subsequent processing phase, causing a reduction in the sector with negative effects on industries active throughout the tobacco processing chain.

7. Conclusion

This paper aims to evaluate the socio-economic effects of the coming tobacco reform in Italy through a farm model based on the Positive Mathematical Programming approach. The micro-data used for the present analysis is related to the farm accounting information contained in the FADN-Italy database for the tobacco specialized farms. In this framework, each farm models reproducing the farm behaviour are implemented in order to have some relevant information to the future farmers responses to the introduction of the new tobacco reform. In a more specific manner, the information obtained by the models concerns the modification in the land allocation, the consequent changes in farm revenue and the impact on the employment in agriculture and in the tobacco industry.

The scenarios describing the April 2004 Reform proposal would have significant effects on tobacco cultivation in Italy and cause a drastic reduction in the overall tobacco production in all farms of the sample, leading to the complete disappearance of some production realities. The variation in production supply is accompanied by a strong farm reorganisation process, which implies the partial (and total) substitution of tobacco crops with other processes present in the farm (above all wheat and protein crops). The variation in production organisation differs from region to region, precisely as a consequence of the various alternative processes. The greatest economic effect caused by the Reform is represented by the reduction in overall aid that farms would receive in the form of coupled and decoupled payments. Despite this reduction, the general effect on farm gross margin is positive in almost all scenarios and farm typology considered, mostly because of the parallel decrease in variable costs.

A detailed analysis of the Reform impact on the employment has been also carried out. It was seen earlier that the scenarios examined produce a drastic reduction in tobacco cultivation in all regions under consideration. It is clear that this reduction will have serious consequences on employment across the entire tobacco chain and its related activities. During the year 2002, over 125,000 workers were employed through the entire tobacco supply-chain (including production and processing). In scenarios of reform proposal, the negative effects are higher in the Campania region where workers employed in tobacco farms drop from 78,000 in the base situation to 4,500 in the other scenarios. In Umbria and Veneto the complete disappearance of tobacco cultivation affects about 10,000 workers in total, while in Apulia a drop of 18,000 tobacco employees is registered in the less favoured scenario.

As long as the processing phase is considered, a drastic reduction in employees can be seen, especially in Campania and Umbria, those regions that currently have the highest number of employees in this sector. The results confirm that the tobacco districts of Campania and Umbria would be the ones most hit by changes in EC policy, while in the other series of scenarios relating the reform to be applied the more dramatic effects are felt by Umbria and Veneto where the employment in the tobacco industry completely disappear. The effects of these policies, immediately felt in the agricultural production phase, would also be reflected in the subsequent processing phase, causing a reduction in the sector with negative effects on industries active throughout the tobacco processing chain.

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