

Peeling tomato paste subsidies

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The Common Market Organisation (CMO) for fruit and vegetable products is currently evaluated by the European Commission. The evaluation may lead to a reform of the CMO. One of the elements under debate is the production subsidy for processing tomatoes. The processing tomato sector is one of most heavily subsidized sectors in primary production of fruit and vegetables. The current production subsidy equals approximately 50% of producer turnover. This paper evaluates two possible reforms of the processing tomato supply chain: (1) an abolishment of the production subsidy and (2) a replacement of the production subsidy by area payments (decoupling). The evaluation focuses on the impact the reform may have on production and trade patterns of fruits and vegetables in Europe. On the basis of a simulation model, the paper argues that in the first scenario production will shift in the Mediterranean from processing tomatoes and extensive crop production in general towards fruit and fruit vegetables. The abolishment of the production subsidy will lead to a production shift in the direction in which Mediterranean countries have a comparative advantage. In the second scenario, Mediterranean production will remain stuck in extensive crop production: processing tomatoes, extensive vegetables and arable crops. In the first scenario, Mediterranean countries will crowd out North European fruit production. As a result, North European production shifts towards vegetable production. In the second scenario, the impact on North Europe is negligible.

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Introduction

The Common Market Organisation (CMO) for fruit and vegetable products is currently evaluated by the European Commission. The evaluation may lead to a reform of the CMO, among other things in order to meet future WTO requirements. The CMO for fruits and vegetables distinguishes several fresh and processed fruits and vegetables, among which tomatoes for the processing industry. The processing tomato sector is one of most heavily subsidized sectors in primary production of fruit and vegetables. The current production subsidy equals approximately 50% of producer turnover. The European Commission considers reducing the production subsidy for processing tomatoes and replacing the subsidy by area payments. This paper evaluates two possible reforms of the processing tomato supply chain: (1) an abolishment of the production subsidy and (2) a replacement of the production subsidy by area payments (decoupling). The evaluation focuses on the impact the reform may have on production and trade patterns of fruits and vegetables in Europe. The HORTUS simulation model is used to analyse whether Mediterranean growers switch from processing tomatoes to other crops and what effect this switch may have on North European production of fruits and vegetables.

This report is constructed as follows. Section 2 describes the tomato processing supply chain and evaluates the current CMO for processing tomatoes. Section 3 presents the results of the simulation analysis. Section 4 concludes.

The European processing tomato supply chain

The European Union pursues an active policy for the processing tomato supply chain since 1978. From 1978 to 2000, the EU subsidized the tomato processing industry through a quota system provided the industry paid minimum prices to growers. Since 2001, the EU pays production subsidies directly to producer organizations of processing tomatoes. This section briefly describes the European processing tomato supply chain and the current CMO for processing tomatoes.

The European supply chain

The European tomato processing industry processed 11,380,100 tonnes of raw tomatoes in 2004. Italy is by far the most important producer of processing tomatoes in Europe with a 53% share of European production followed by Spain (22%) and Portugal and Greece (10% each). Other producers include France, Hungary and Poland. The main products of the tomato processing industry are tomato paste (65%) and canned whole peeled tomatoes (27%). Canned tomatoes are almost exclusively produced in South Italy. European production has grown over the 1995-2004 period (average annual growth of 2.3%), in particular in Spain (5.1% growth), but also in Italy and Portugal (2.7% and 1.1% respectively).

Processing tomatoes are grown on large, specialised, mechanised arable farms. Typically, producers of processing tomatoes produce tomatoes alongside arable crops such as cereals, oil seeds, sugar beets, olives, grapes and vegetables in the open. This is illustrated by Table 1 which is based on a FADN sample. The table shows that growers of processing tomatoes tend to be large and have arable crops as substitutes in supply. The

average size of the farms is relatively large compared to the average size of typical horticultural enterprises. Average size ranges from 20 hectares (Puglia) to 185 hectares (Emilia-Romagna). Average size allocated to processing tomatoes ranges from 4.4 hectares in Puglia to 12.9 hectares in Emilia. Note that the numbers are based on the FADN sample and that actual numbers may differ a little. Growers of processing tomatoes grow a range of products most of which are arable crops including extensive vegetables. Cereals are the most important crop processing tomato growers produce. ‘Protected vegetables’ are typically not produced by producers of processing tomatoes.

A possible reduction in the subsidy of processing tomatoes is likely to lead to a shift to substitute products. From an agronomic perspective, current substitutes in production are the most likely candidates. This implies that current growers of processing tomato are likely to switch to arable crops and extensive vegetables production. In current building plans, ‘protected vegetables’ such as fresh tomatoes, cucumbers and sweet peppers are no substitutes in supply for processing tomatoes. Vegetables in the open, however, are part of current building plans of processing tomato growers, especially in Puglia and Ribatejo e Oeste. Since the major part of current building plans refers to arable crops, one may expect supply substitution between processing tomatoes and arable crops as a result of which the total area devoted to fruits and vegetables production may fall after the reform of the CMO.

The Common Market Organization for processing tomatoes

The CMO for processing tomatoes was established in 1978 in order to protect European producers from world market competition, in particular Californian competition. World

market prices were considered too low to allow a reasonable standard of living to European producers (Pritchard and Burch, 2003). In 2001 the European Union amended the CMO for processing tomatoes in order to meet WTO requirements, to curtail expenses on the tomato processing supply chain and to address some anomalies in the old regulation.

Table 1 Building plans of processed tomato growers

	Sample	Total hectares	Tomatoes for processing	Vegetables in the open	Protected vegetables	Cereals	Sugar beets and oil seeds	Olives and vineyards	Other uses	
Italy	Emilia-Romagna	60	186,43	6,9%	2,2%	0,0%	46,8%	15,8%	0,5%	27,8%
Italy	Puglia	51	19,38	22,7%	14,9%	0,2%	32,6%	0,6%	22,3%	6,7%
Spain	Extremadura	11	47,66	14,5%	0,0%	0,0%	41,0%	0,3%	2,0%	42,1%
Portugal	Ribatejo e Oeste	56	25,85	45,6%	7,6%	0,1%	23,2%	5,3%	4,9%	13,3%
Portugal	Alentejo e do Algarve	7	93,07	7,2%	1,4%	0,1%	54,8%	10,6%	5,3%	20,6%

Source: FADN.

The CMO for processing tomatoes is made up of three elements:

- *Import tariffs on imported processing tomato products.* The European tomato processing industry is protected from imports from outside the European Union by import tariffs on processed tomato products. The *ad valorem* import tariff has been gradually reduced from 18 per cent in 1995 to 11 per cent in 2004.
- *Export restitutions for exported processing tomato products.* Export subsidies make up the difference between European and world market prices in order to foster European exports.
- *Support for domestic (European) production.* This is by far the most important element of the CMO. This part involves 300 million euro (2000) and will be elaborated below.

From 2001 onwards, the EU pays a production subsidy of € 34.50 per tonne for processing tomatoes. The subsidies are paid to tomato growers through producer organizations. The subsidy regime is subject to national production thresholds. The national thresholds are not converted into individual thresholds for producer organizations. Instead, the producer organizations have to submit applications for processing aid to the responsible national authorities. When the application is approved, the quantity applied for shall count against the Member State's threshold. Therefore it goes: 'First come, first served'. If a country exceeds its threshold, the payments per tonne are reduced proportionately in the following years.

So far, the new arrangement performed as follows:

1. The number of processors decreased more rapidly over the year 2000-2004 than it did over the years 1994-2000 (Pritchard and Burch 2003; EU-MED AgPol). This result is due to the fact that the 1978 mechanism protected individual processors, while the 2001 mechanism does not. The exit of inefficient processors benefits grower prices.
2. Grower prices decreased in Italy and Portugal, but not in Spain and France (AMITOM, 2006). One may expect a decrease in grower prices after the abolishment of the minimum price arrangement. This only happened in Italy and Portugal.
3. There still is overproduction despite the fact that the new threshold exceeds the old quota by far. As a result, EU expenses exceed target expenses (€ 300 million) by

far: € 380 million in 2005 and € 360 million in 2006 (European Commission 2006). Pritchard and Burch (2003) expected overproduction to fall.

Simulation analysis

In this section we illustrate what the likely impact of a change in the subsidy for processing tomatoes will be on production and trade in fruits and vegetables in the European Union.

The report analyses two possible reforms:

1. The abolishment of the production subsidy without a compensation in terms of an area or any equivalent payment;
2. The abolishment of the production subsidy with partial compensation in terms of an area or an equivalent payment. The area payment is assumed to prescribe the allocation of some land to the production of processing tomatoes in order to prevent unfair competition for growers of other vegetables, fruit and arable crops.

The impact on production and trade is estimated using HORTUS, a supply and demand model for production and trade in fruits and vegetables in the European Union. With respect to the parameters, the following choices are made:

Grower subsidies

In 2001-2003, the average grower price for processing tomatoes was approximately 67 euro per tonne (FADN). The subsidy amounts to 34.50 euro per tonne; say, fifty percent of the grower price. We assume that the subsidy equals fifty percent of the grower price.

Demand and supply substitution

We assume that the price elasticity of the demand for processed tomatoes is low: -0.2%. The substitution elasticity between processing tomatoes from the various countries of origin (exporters) is assumed to be low as well (1.25%). A substitution elasticity of 1.25% implies that if prices of imports from Italy grow with 1% above the overall import price index, imports from Italy fall with 1.25%. European production is sheltered from international competition due to transportation costs, differences in standards and attitudes towards genetically modified raw inputs (Pritchard and Burch 2003). Rickard (2003) argues that there are three geographical markets in the world for processing tomatoes: the Americas, Europe and the Mediterranean, and the Far East. Turkey (and to some extent) China are the only serious competitors for the European tomato processing industry. However, there is some discussion on this point. Italian experts expect non-European exporters to be able to expand their exports to the EU substantially.

For the supply side, we estimated the substitution elasticities. The substitution elasticity between the three main groups of products – fruits, protected vegetables and vegetables in the open – is low (0.10). The within group elasticity is substantially higher. For fruits, the within group substitution elasticity is higher in North Europe (0.60) than in the Mediterranean (0.30), because Mediterranean fruit production is more diversified than North European production. For vegetables, the substitution elasticity equals 0.30 for protected crops and 0.60 for vegetables in the open.

The impact of a reduction in the production subsidy

This section presents the impact of abolishing the production subsidy for processing tomatoes. The abolishment of the production subsidy causes an upward shift of the supply function of processing tomatoes. Growers of processing tomatoes will shift their acreage to other crops in their building plan. They will grow processing tomatoes less often and on smaller lots. Assuming constant returns to scale at national levels and a price inelastic demand for processing tomatoes, the abolishment of the production subsidy will be met by an increase in the prices the processors pay for processing tomatoes (Table 2).¹ Grower prices fall slightly. Given the elasticities chosen, the demand for (European) processing tomatoes and thus the output of the tomato processing industry will fall by approximately 15% in Greece, Portugal and Spain and by more than 30% in Italy. Turkey and the Rest of the World will be able to increase imports into the EU and as a result their production.

Table 2 suggests that Italy will face the largest drop in output of processing tomatoes. Italy is a large importer, exporter and re-exporter and will face a surge in imports from the Rest of the World in its home market. Italy is also by far the largest exporter to non-EU countries and faces a major decrease in its exports to these markets. For Greece, Portugal and Spain, domestic demand is the most important driving factor. This shelters their domestic production to some extent.

¹ Tomato growers and processors are price takers. The price of final products is fixed due to market competition among producers and processors, both national and international, between processors and retail chains, and due to the low level of product differentiation. However, even though producers and processors are price takers, this does not imply that producers and processors are not able to pass on cost increases. Cost increases follow from entry and exit processes.

Table 2 The impact of scenario I on the processing tomato supply chain (percentage changes)

	Input prices of processing in- dustry	Grower prices	Hectares	Output / Industry de- mand
Greece	49.5	-0.5	-14.2	-14.2
Italy	48.6	-1.4	-36.5	-36.5
Portugal	49.6	-0.5	-15.7	-15.7
Spain	49.7	-0.3	-14.7	-14.7
Turkey	-	0.0	4.0	4.0
ROW	-	0.0	10.6	10.6

What is even more important is the fact that agricultural production will lead to a production shift in the direction in which the Mediterranean countries have a comparative advantage: fresh fruit and vegetables. In Greece, Portugal and Spain, the area allocated to fresh fruit and vegetables grows moderately by 0.2-1.0%. In Italy, the area allocated to fresh fruit and vegetables grows by 1.6-1.8% (see Table 3). Due to the fall in demand for processing tomatoes, extensive crop production in general becomes less attractive. As a result, growers will switch not only from processing tomatoes to the production of other extensively produced vegetables and arable crops, but also to fruit and fruit vegetables. This makes a possible fall in the total area employed in fruit and vegetables production unlikely, on the contrary, and gives a spur to the general shift from arable crops to fruit and vegetables in Europe (EC 2004).

As a result of the growth in Mediterranean production of fresh fruit and vegetables, North European countries will face fiercer competition in the production of fresh fruit and vegetables. As a result, there are minor shifts in North European production from fruit to vegetables (which are present in the results but not really visible from Table 3).

Table 3 Area development in Europe under scenario I (percentage changes)

	Fruit	Vegetables in the open	Processing tomatoes	Fruit vegetables
Greece	0.6	0.5	-14.2	0.5
Italy	1.6	1.8	-36.5	1.8
Portugal	0.4	0.5	-15.7	0.9
Spain	0.2	0.3	-14.7	0.4
Rest of Europe	0.0	0.0	-22.4	0.1
Turkey	-0.2	0.4	4.0	0.0
Rest of the world	-0.1	0.1	10.6	0.0

The impact of decoupling

In this section, we discuss the impact of a subsidy reduction plus the introduction of area payments. We assume that area payments prescribe the allocation of some land to processing tomatoes in order to prevent unfair competition with producers of other vegetables, fruits and arable crops. The impact of area payments is modelled by assuming that the land allocation in the countries producing processing tomatoes adjusts partially to the price incentives implied by the subsidy reduction.

Land allocation adjusts partially to the price incentives implied by the reduction in the production subsidy and the associated fall in demand. Because land allocation does not adjust fully to the price incentives a gap arises between area and output developments. Output falls much harder than land (Table 4). Because land use for processing tomatoes becomes more extensive, growers of processing tomatoes will employ less labour and capital. The resulting reduction in capital and labour costs will lead to a fall in grower prices due to sharp product competition. The basic difference between scenario I and scenario II is that under scenario I, growers of tomato processors are able to shift the burden of the price reduction to the producers of other crops by switching crops. In scenario II, the burden of the fall in grower prices falls primarily upon the growers of processing tomatoes.

Table 4 The impact of scenario II on the processing tomato supply chain (percentage changes)

	Input prices of processing in- dustry	Grower prices	Hectares	Output / Industry de- mand
Greece	35.3	-14.7	-9.5	-12.5
Italy	27.5	-22.5	-15.0	-19.5
Portugal	34.8	-15.2	-10.4	-13.4
Spain	36.4	-13.6	-9.9	-12.6
Turkey	-	0.0	2.5	2.5
ROW	-	0.0	6.0	6.0

The partial adjustment in land allocation and the impact on grower prices have major consequences for growers' substitution behaviour in the Mediterranean area. Growers

of processing tomatoes will switch to arable crops and extensively produced vegetables rather than fresh fruit and fruit vegetables. Growers of processing tomatoes remain stuck in the production of arable crops and extensive vegetables and within this category they switch to products like onions, carrots and potatoes, but probably also to cereals, sugar beets and oil seeds.¹ As a result of this lack of substitution behaviour in the Mediterranean area, North Europe is hardly influenced at all (see Table 5). If production in North Europe is influenced at all, this refers to vegetables in the open.

Table 5 Area development in Europe under scenario II (percentage changes)

	Fruit	Vegetables in the open	Processing tomatoes	Fruit vegetables
Greece	0.4	1.4	-9.5	0.3
Italy	0.7	2.0	-15.0	0.6
Portugal	0.3	1.1	-10.4	0.2
Spain	0.1	0.6	-9.9	0.1
Rest of Europe	0.0	0.0	-12.4	0.0
Turkey	-0.1	0.2	2.5	0.0
Rest of the world	0.0	0.0	5.7	0.0

Conclusion

In 2006-2007, the European Union evaluates and possibly amends the Common Market Organisation (CMO) for fruits and vegetables. One of the principal elements of the current

¹ Note that arable crops are not included in the model.

CMO is a production subsidy for processing tomatoes. The European Union considers reducing and decoupling the subsidy for processing tomatoes. This report evaluates what the likely impact is of these changes on production and trade patterns for fruits and vegetables in the EU.

More specifically, the report comes to findings for two scenarios: (I) the abolishment of the production subsidy for processing tomatoes; and (II) the replacement of the production subsidy by an area payment. For scenario I, we come to the following conclusions:

- The reduction in the production subsidy is likely to be passed through into higher input prices for tomato processors. Input prices may rise with fifty percent. Grower prices will decrease to some extent (0-2%).
- Demand for European processing tomatoes will fall with 15% in Greece, Portugal and Spain and more than 35% in Italy. Demand for European processing tomatoes may fall harder, if imports from non-European production areas rise faster. There is some discussion on this point. Pritchard and Burch (2003) and Rickard (2003) indicate that the European market is sheltered from international competition due to transport costs. Italian experts expect non-European producers to be able to expand their exports to the EU substantially in the long run.
- The subsidy reduction will make not only the production of processing tomatoes less attractive, but also the production of other extensively produced crops. As a result, Mediterranean farmers will switch not only to the production of other extensively pro-

duced crops, but also to fresh fruit and fruit vegetables (and, of course, also to crops not included in the model).

- In North European fruit markets, Mediterranean exporters replace domestic producers of fresh fruit and vegetables to some extent. As a result, North European growers switch from fruit to vegetables production.

If the abolishment of the production subsidy is compensated by area payments, the above results change into the following results:

- Grower prices fall substantially. Even though demand for processing tomatoes falls substantially, Mediterranean growers will not adjust their land allocation fully (in order to collect area payments). The area allocated to processing tomatoes will fall by 10-15%; production will decrease by 12-20%. Growers will produce more extensively and reduce capital and labour costs. Grower prices will fall with production costs. The burden of falling producer prices falls on growers of processing tomatoes only and is not shared by other producers of other crops as is the case in scenario I.
- Mediterranean growers switch to vegetables in the open (and probably also to arable crops). They also switch to some extent to fruits and fruit vegetables. North European production is hardly influenced.

Basically, the paper stresses that the Mediterranean countries have a comparative advantage in the production of (fresh) fruit and fruit vegetables rather than extensively produced crops among which processing tomatoes. A reduction in the production subsidy for proc-

essing tomatoes will lead to a shift in production in the Mediterranean towards this advantage. Possible reductions in subsidies related to fruit production may countervail this development to some extent. In policy terms, processing tomatoes are the Mediterranean's defensive interests and (fresh) fruit and fruit vegetables the Mediterranean's offensive interests. The production loss in horticulture and food processing for processing tomatoes will be compensated by other products. Of course, some production regions may face important adaptation costs. Area payments with restrictions on land use countervail the development towards comparative advantage. Area payments lower the adjustment burden for growers of processing tomatoes but at the cost of lower grower prices.

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