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A Box Evaluation Tool for Alternatives Mediterranean Agricultural Policy

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Femise Coordinators

Economic Research Forum

Institut de la Méditerranée

PROJECT FEMISE III

A Box Evaluation Tool for Alternatives Mediterranean Agricultural Policy

Femise Theme: Agriculture in Transition

Leader Institute: **AGREEM – UAM**
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SUMARIO

(First Draft – Not quotable)

FEMISE tiene una vocación clara de convertirse en el referente necesario cuando se acometen negociaciones o estudios referidos al desarrollo de un ambicioso proyecto: la Conferencia de Barcelona. Siguiendo este fin, en el Forum FEMISE de diciembre de 2004, se pidió a los distintos grupos de investigación que se atuvieran a las siguientes líneas maestras a la hora de realizar sus proyectos de investigación:

1) Crear marcos de toma de decisiones verdaderamente útiles para su utilización final por políticos, empresarios y asociaciones cooperativas, apoyados en software de utilización sencillos.

2) Adecuar los estudios a situaciones concretas: "producto a producto" y uniendo los aspectos cuantitativos y cualitativos.

3) Generar estos marcos de simulación con el debido rigor académico que se les supone a los grupos de investigación presentes en la red, casi todos ellos del entorno universitario.

4) Responder a la óptica "desde las dos orillas" presente en el Forum a partir de los partenariados investigadores norte-sur.

En este contexto se presentan los resultados de la investigación para la creación de "A Box Evaluation Tool for Alternatives Mediterranean Agricultural Policy", título que le hemos dado al proyecto de investigación.

Para afrontar el objetivo de generar una herramienta verdaderamente útil, y en la línea de los trabajos que ya lleváramos a cabo durante 2004, este equipo ha prestado especial interés a la generación de una plataforma de simulación de fácil manejo para los usuarios no especialistas en modelización cuantitativa. Así, nuevamente se ha desarrollado un programa de simulación en MS-Excel y Visual Basic, de cara a dar total

accesibilidad y transparencia a los distintos resultados de las simulaciones que el usuario final pueda realizar. En dicha plataforma, se obtienen los siguientes ítems:

> Como "variables Input", el usuario controla las principales variables a modificar en el caso de realizar una simulación: estimación del arancel equivalente, mecanismo de liberalización (progresivo, proporcional, instantáneo), tipo de cambio en el horizonte de predicción, valoración de las principales macromagnitudes de predicción, etc. Por supuesto, realizar cambios en estas variables es optativo y, a modo de guía inicial, se le presenta el escenario base considerado más probable por este equipo de investigación.
>
> Como "variables output", el usuario encuentra los resultados de su simulación, y las del escenario base, respecto a los efectos que se producen en cuanto a incremento de las exportaciones, aumento de la producción y del valor añadido para cada sector de la economía del Sur y generación de empleo y renta en los sectores implicados.

El segundo gran objetivo es un clásico en la literatura económica al uso: solo afrontando producto a producto este tipo de investigaciones, se puede generar un marco de estimación válido para su utilización final. En la agricultura, más que en ningún otro aspecto, es absolutamente clave generar estudios que contemplen "producto a producto" las especificidades de estacionalidad, calidad, precios relativos, características de los mercados, competitividad internacional.

En este sentido, la investigación se centra en la construcción de un "esquema piloto" de actuación centrado en un producto (el tomate) y un mercado (el de la UE y Marruecos), como comienzo de una serie de aplicaciones del mismo sentido para el resto de los productos y mercados relevantes en el seno del tráfico agrícola mediterráneo.

Para acometer este estudio particularizado, es necesario partir de la óptica mundial con la que trabajan los productores del tomate, realizando un análisis en profundidad desde lo general a los específico, con el objetivo de determinar las principales claves cuantitativas y cualitativas de la relación en la que, finalmente, hemos puesto mayor hincapié: el mercado del tomate marroquí en la UE.

Por supuesto, se ha prestado especial interés a la investigación las cadenas de distribución del producto, descendiendo al nivel más aplicado posible a través de su análisis "in situ", para lo cual se realizaron prospectivas del mercado mundial y, concretamente, de las cadenas de distribución y logística marroquíes en las principales áreas en las que este país desarrolla el comercio del tomate.

El tercer gran objetivo que se marcaba (rigor científico), se traslada a esta investigación a partir del empleo de herramientas econométricas avanzadas para la estimación de la cadena de impactos económicos presente en el país en el que se produce el incremento de las exportaciones. Tres grandes aspectos se acometen en este sentido:

a) La estimación de la tarifa equivalente al actual sistema de protección mixto (contingentes y tarifas) es el punto de partida obligado y en esta investigación se realiza un exhaustivo análisis de las mismas a partir de las directrices que indicar la Organización Mundial del Comercio (OMC) al respecto. En este sentido, se hace una evaluación estricta del sistema del *Price Gap* exigido por esta organización. Para el caso del tomate marroquí se ha estimado una tarifa equivalente del 18,1%.

b) En segundo lugar, es básica la determinación de la elasticidad precio de las exportaciones marroquíes, para lo cual se emplean modelos econométricos estructurales incluyendo la variable objetivo y el resto de las variables básicas para la construcción de un sistema no sesgado en la estimación. En este sentido, para el período de estimación en el caso del tomate marroquí se obtuvo una elasticidad de 0,78-

c) En tercer lugar, para la determinación de la transmisión de efectos económicos en los sectores productivos marroquíes se emplea lo que hemos denominado un "Modelo de demanda de Leontief dinamizado" – Modelo Agri-MED. Con él, se puede estimar dicha cadena de efectos a través del conocimiento de la estructura productiva marroquí presente en las TIO modificadas para traerlas al presente y dinamizadas, para que sean capaces de recoger los cambios en productividad en

el período de simulación. A modo de resumen, los principales resultados obtenidos, en el caso de un desarme arancelario progresivo, son los siguientes:

Principales resultados de la simulación de una apertura en la UE al tomate marroquí

	2006	**2007**	**2008**	**2009**	**2010**	**SUM**
Tariff Reduction *(Percentage)*	1,21%	2,41%	3,62%	4,83%	6,03%	18,1%
Tomato Exports Increase *(Mill of euros)*	12,6	25,2	37,7	50,3	62,9	189
New Added Value *(Mill of euros)*	13	27	40	53	67	200
New Employment *(Persons)*	291	577	855	1.135	1.410	4.267

En último lugar, el análisis no estaría completo si no se realizara un estudio de las implicaciones y alternativas en las "dos orillas", atendiendo así a un análisis pormenorizado de cuáles son los puntos de encuentro y de fricción tanto en los países y regiones de la UE como en Marruecos. En este sentido, es fundamental realizar análisis de importancia relativa de los efectos positivos de la creación de un área de libre comercio agrícola (en este caso para Marruecos y para el consumidor europeo) y cuáles son las medidas compensatorias necesarias en Europa para atender a las pérdidas generadas en diferentes regiones, que dejarían de gozar de un mercado especialmente protegido.

En este sentido, el estudio de caso que se presenta para Marruecos-UE y tomate, genera especiales puntos de fricción al enfrentar los intereses del mercado español de tomate temprano con el incremento de exportaciones en Marruecos. La coincidencia en estacionalidad entre ambos mercados produce los puntos más conflictivos a tener en cuenta para determinar la viabilidad de un mercado de este tipo, surgiendo necesariamente cuestiones relativas a la articulación de la liberalización en el corto y en el medio plazo.

En este proyecto se presentan los siguientes documentos de análisis:

1. Summary

2. The World Market For Fresh And Refrigerated Tomatoes

3. The Trade And Export System Of Moroccan Fruit And Vegetables

4. An Equilibrium Model to Determine The National Effects Of Agricultural Liberalisation In The Mediterranean Basin. Model Agri – Med

5. Estimation Of The Tariff Equivalent To The Quota System Applied To The Import Of Moroccan Tomatoes

6. Resultados de la Simulación de una Liberalización Progresiva de las Tarifas Equivalentes en el Caso de Marruecos

THE WORLD MARKET FOR FRESH AND REFRIGERATED TOMATOES

Dr. Rafael de Arce and Dr. Ramón Mahía[1]

SUMMARY

The objective of this article is to give a descriptive and analytical picture of the world market of both fresh and refrigerated tomatoes. It also provides an international comparison from the origin of the product (production) to the characteristics of its international trade, with special emphasis on the highlighting of the main agents in this market and, in particular, on their dimensions and relevance in the European market. The article also looks at the main competitors within the framework of an agricultural policy directed towards the liberalisation of tariffs with Mediterranean countries, in particular, Morocco. Given the detail which permits the analysis of such a specific product, determinant aspects regarding its international positioning are researched, such as the perceived quality of the product by the consumer, its different seasonal characteristics, the current chain of distribution, etc. The economic literature demonstrates, without any doubt, that only by means of this direct approach can the rigorous process of opening up markets be undertaken.

[1] Professors from the Department of Applied Economics of the UAM (Econometrics) and researchers from AGREEM. Research financed by FEMISE and lead by Professor Dr. Alejandro Lorca.

I. Introduction

The objective of this article is to give a descriptive and analytical picture of the world market in tomatoes without elaborating. It also provides an international comparison from the origin of the product (production) to the characteristics of its international trade, with special emphasis on the highlighting of the main agents in this market and, in particular, on their dimensions and relevance in the European market. It also looks at the main competitors within the framework of an agricultural policy directed towards the liberalisation of tariffs with Mediterranean countries, in particular, Morocco.

The analysis begins by making an exhaustive description of the different areas and counties in the world in which tomatoes are found, whether they be producers or consumers. It also analyses the characteristics of the crops in each area (relative profitability, productive specialisation, importance as a transit country or export - import, etc.). To that effect it is absolutely essential to identify the capacity for increasing production in the future from the study of the European case especially "under plastic", enabling us to make estimations regarding the "*output gap*" in tomato production in countries such as, Morocco.

In the third part, a far-reaching analysis is carried out on the world's main export and import markets. The analysis also highlights the trends and significance relative to the product and how the market is distributed.

The fourth part sets out a picture of the tomato as a product of international trade in the European Union with the rest of the world, particularly non-Community Mediterranean countries with special attention paid to Morocco.

Finally, a brief analysis is carried out in the distribution traits of the tomato in the world, paying special attention to the inter-regional differences as well as the importance of the conversion towards products in the integrated chain thanks to the expansion of hypermarkets in the last decade.

It can be seen in the whole article that, in spite of the weight on the sum total of world trade not being especially relevant, special interest is placed on Moroccan tomatoes,

bearing in mind that international trade is not on a global level, but centred on specific areas and periods of the year, in which there are very few countries involved. Specifically, and in the trade within the European Community, where the relationship between the Moroccan and Spanish tomato will be considered as a possible point of friction.

II. Production and apparent national consumption of tomato

The production of tomatoes is common in the greater part of those countries having suitable areas for their cultivation (irrigation, temperate climate), making it easy to find different varieties at multitude of latitudes, although very often, hardly enough for home consumption in the country itself.

For the world total, we can speak of an average annual tomato production of a little more than 100 million tonnes, distributed in very diverse ways across the different continents. To that effect, a list of leading countries can be drawn up according to the total production of tomatoes (measured in metric tonnes) and for an average period of several years, with a view to determining an average level of production not biased by the impact of the different harvesting times resulting from the climatic features of that particular time.

China is the world's greatest tomato producer, just on its own cornering more than a fifth of the world total. In the European Union, the world's second largest producer, tomatoes are only grown in some countries of the area; mainly in the Mediterranean area, Holland and Belgium. It must be pointed out that in this area the limited weight of tomato production represented by the countries recently incorporated in to the Union (if the former fifteen members of Europe made up 14.4%, the remaining ten countries of the Union only makes up about 0.6% more of this product in the world percentage).

As will become clear in later sections of this research, in the first phase of the study only the production of tomatoes is considered, as it is only relevant here to show that the greatest world producers almost never coincide with the greatest exporters. It is worth, as an example, simply pointing out that in spite of Asia producing more than 40% of the

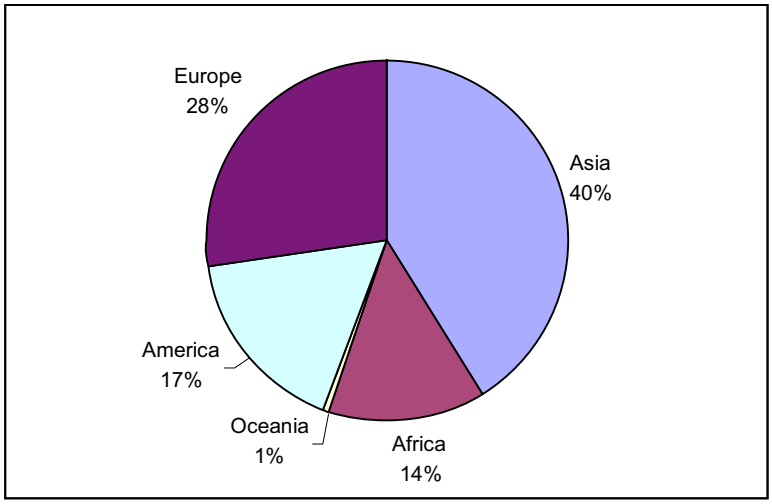
world's tomatoes, it has very little presence in international sales circuits. That is, almost all of its production is destined for home consumption in the area.

World Production of Tomatoes
(Metric Tonnes Average 1996-2003)

Area	**1996 - 2003**	**Percentage**
China	23,081,655	21.8%
European Union 15	15,198,796	14.4%
United States of America	11,304,290	10.7%
Turkey	8,545,125	8.1%
India	7,347,500	6.9%
Italy	6,469,163	6.1%
Egypt	6,419,090	6.1%
Spain	3,770,043	3.6%
Islamic Republic of Iran	3,213,261	3.0%
Brazil	3,204,336	3.0%
Mexico	2,192,353	2.1%
Morocco	1,006,540	1.0%
Others	13,290,452	12.6%
European Union 25	15,894,145	15.0%
Total	**105,737,952**	**100.0%**

Source: FAOSTAT

World Production of Tomatoes by Continent
(Percentage in TM)



Source: compiled by the author from data provided by FAOSTAT

In order to achieve an overall measurement of the relative significance of tomato cultivation on the agricultural economy of each country, it is of interest to measure the degree of agricultural specialisation of this product, calculating the ratio of hectares

dedicated to tomato growing from the total number of hectares dedicated to the cultivation of crops. At the same time, and with a view to estimating its productivity, it is also relevant to determine the average profitability of this product per country (*yield* in FAO terminology), calculating the ratio between the tomato production (Hg) and the area dedicated to their cultivation (Ha).

Regarding the first ratio (hectares of tomato / total hectares for all crops), it is worth pointing out, almost anecdotally, that Mauritania is the country with the highest agricultural intensity for tomatoes: 16% of all of its cultivated land. Among the countries on the Mediterranean basin who are signatories to the Barcelona agreement, with total proportion of around 5% of the area cultivated, the following must be highlighted: Greece, Jordan, Malta, Egypt, Malta y Palestine.

Proportion of the cultivated surface dedicate to tomatoes
(The 20 countries with the highest intensivity)

Country	% Tomato	Country	% Tomato
Albania	2%	Greece	2%
Armenia	2%	Jordan	5%
Azerbaijan Rep.	2%	Kuwait	5%
Bahamas	8%	Malta	3%
Bahrain	2%	Mauritius	16%
Bermuda	3%	Montserrat	5%
Cuba	4%	Palestine OccupTr.	3%
Egypt	5%	Puerto Rico	6%
French Polynesia	3%	Qatar	4%
Georgia	2%	Seychelles	4%

Source: compiled by the author from data provided by FAOSTAT

On the other hand, among the world's largest producers, the proportion of cultivated land dedicated to tomatoes is, in every case, between 0.5 and 1%, except Egypt (4.7%) and Italy (2.1%). We conclude, therefore, that the cultivation of tomatoes seems to have a greater relevance in those countries on the Mediterranean basin, mainly those of the south. Thus, it is fundamental to determine the profitability of these crops in order to approximate the potential capacity in the future (*output gaps*).

With the second aforementioned ratio of interest (the profitability of production per hectare), we can see that among the 20 countries with the greatest profitability in the cultivation of tomatoes, 15 of them are European.

Yield of Tomato Harvested Area
(Hg / Ha world position and value over world average)

Country	Position	Over mean	Country	Position	Over mean
Netherlands	1	11.23	Canada	16	2.20
Belgium	2	9.43	Cyprus	17	1.84
Sweden	3	7.94	Palestine Occup Tr	18	1.81
Norway	4	6.79	Ireland	19	1.74
Finland	5	6.49	USA	20	1.67
Iceland	6	5.66	Kuwait	21	1.51
Denmark	7	4.98	Chile	22	1.49
Austria	8	4.74	Korea Rep	23	1.49
United Kingdom	9	4.02	Spain	24	1.40
New Zealand	10	3.13	Brazil	25	1.34
Germany	11	3.11	Japan	26	1.34
France	12	3.08	Portugal	27	1.31
Switzerland	13	2.94	Lebanon	28	1.30
Israel	14	2.70	Morocco	29	1.25
United Arab Emir.	15	2.36	Italy	30	1.25

Source: compiled by the author from data provided by FAOSTAT

It is important to make a special comment on the ratio between the profitability of each country to the average profitability of tomato production in the world (called *over mean* in the previous table). It can be seen that in the case of Holland and Belgium we would be talking of production of more than 11 times that of the world average, also covering other European countries' (not necessarily intensive in the cultivation of tomato) high margins of profitability (between 3 and 8 times greater than the average). On the opposite extreme, other great players in the international trade in tomatoes such as Spain or Italy have a profitability very close to the average (barely above one)[2].

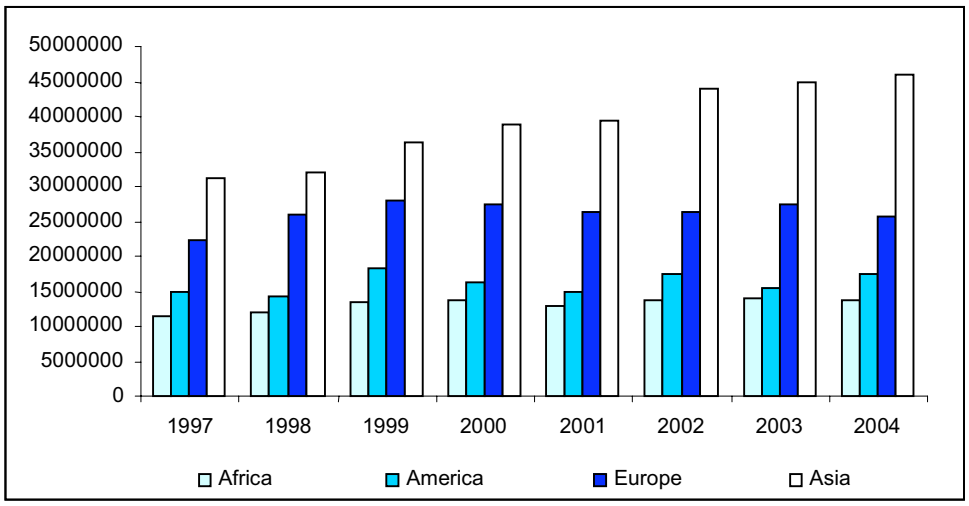
Almost certainly, the use of technology and plastic as well as the use of prepared seeds in the cultivation of tomatoes account for these very great differences, especially in Holland and Belgium, where the data are of special interest as both countries are very dynamic in the international production and commercialisation of tomatoes in the world.

Looking now at the historical evolution over the past ten years, world production has risen at an average accumulated rate 3.7% annually, although, of course, there are

[2] Of course, as a general measurement of the production of tomatoes, if the calculation itself is made in the case of very specific regions (such as Almería in Spain) where the production is almost90% under plastic, the results would be very different.

alternate periods of both positive and negative growth resulting from the climatology as well as specific situations in each country and its geographical areas. In any case, the growth experienced in Asia is particularly important (only China, being the largest world producer, recorded average increases of 9% between 1997 and 2004). In Europe it is important to underline an increase of more than the world average and positive, as opposed to an average loss in Africa and America.

Evolution of tomato production per continent 1997-2004
(Metric Tonnes)



Source: compiled by the author from data provided by FAOSTAT

By increasing the reference period, it can be seen that a number of technical improvements have been made in the world production of tomato that have made a notable contribution to distinguishing between highly competitive and technologically based cultivation processes and areas in which a purely traditional method of cultivation takes place. Without wanting to be exhaustive in the description of these technological changes, by understanding that this exceeds the objectives of this research, it is necessary to point out some of the factors that have been decisive in the development of the production and commercialisation of the product[3]:

- In the middle of the nineteen seventies, drip irrigation was incorporated into the early production of tomatoes in greenhouses together with hybrid seeds in order to give

[3] The reader interested in more information on this aspect can find abundant information on the historical process on the use of technology in the case of Almería in the Cajamar Report (2004) referred to in the bibliography.

the final product a more ad-hoc treatment to the demand characteristics of certain countries (variation in colour, size, a successful harvest period, etc.).

- In the nineteen eighties, a fundamental qualitative improvement was made in the interlined irrigation system for the infrastructures of tomato cultivation under thermal plastic, considerably reducing the costs of maintaining the suitable temperature.

- In the nineteen nineties the chemical process for prolonging the ripening of the tomato as well as its resistance to cold was introduced (GMO). It permitted a greater profitability of the product for its sale at greater distances and, therefore, a greater interest in its cultivation. These years also saw the introduction of much greater improvements in pollinating and irrigation heads.

Related to these technical improvements and although a greatly fragmented production system currently persists at the primary grower level, the past few years has seen a great change in the concentration processes of the commercialisation and cooperative organisation structures in those countries highlighted for having achieved a greater gain in efficiency relating to the cultivation costs.

Although we only have available data for countries from the E.U., it is necessary to point out that more than 104 thousand hectares of tomato cultivation takes place "under plastic" in this area. In the more developed regions in this aspect, the production in greenhouses represents up to 90% of the total (for example, in the case of Almería or Granada in Spain).

This diversity in the tomato production process according to the degree of technical advance gives rise to a significant range of varieties that coexist in the market at different prices. This range originates from the time of year that they come onto the market, the differences in quality and degree of adaptation to the characteristics of the national consumers, etc.

In this context, it is now time to analyse the different prices for the production of tomatoes for the ten largest producers in the world. Of course, we recognise the bias of this analysis as we are not considering the quantity of the tomatoes, rather than just its

average annual price. Thus, one can give a photographic vision of the very diverse productive spectrum in the primary commercialisation of tomatoes produced at a national level.

For the whole of the period 1996-2002, the average price remained at around 531 dollars (measured in parity terms of the national purchasing power), with a dispersion of more or less 127 dollars.

During this period, there appeared a generalised decrease which, on accumulated average it would be around -0.7%, although it is to a much greater extent in the cases of Brazil, Mexico or Turkey. Of course, it particularly highlights the lower prices paid in Iran or Egypt and, on the other hand, the enormous relative cost seen in India.

Prices of Tomato Production 1996 - 2002
(Dollars PPP (*) per 1000 Kg. in the world's main producers)

Country	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Brazil	555.7	474.2	544.1	585.8	572.3	536.3	460.4
China	496.5	462.2	447.7	420.3	455.8	469.2	451.9
Egypt	284.5	285.0	277.9	275.8	265.3	267.9	269.0
India	664.2	667.9	815.5	792.6	822.2	805.3	866.0
Islamic Republic of Iran	266.2	439.0	585.7	201.5	261.8	366.3	260.3
Italy	530.3	588.5	609.1	578.9	590.7	535.1	546.7
Mexico	591.6	840.2	683.9	600.0	489.6	444.4	447.1
Spain	426.8	554.7	598.6	544.4	635.3	469.4	483.5
Turkey	687.6	733.2	701.7	548.5	633.4	488.8	463.8
Morocco	451.1	435.8	458.8	551.0	485.9	437.2	482.4

Source: compiled by the author from data provided by FAOSTAT and FMI
(*) PPP: Parity Purchasing Power

Tied to these prices, it is necessary to bring the basic scheme down to a national level incorporating a brief analysis of the average apparent consumer of tomatoes per person. In this particular analysis (and only for this approximation) we have not only considered national production of tomatoes and the net revenue from its external sales/purchases. In order to carry out a more exact analysis of the apparent consumer, the total amount of tomatoes used in one year in one country has been included in the calculation,

independent of the way of preparing them or their packaging. That is, the revenue from the export and import of prepared tomatoes, packed, ketchup, etc. are included in the following table.

For the way in which the calculation can be carried out, there are evidently several producing countries that appear with the greater apparent consumption per capita. The consumption in those countries on the Mediterranean basin is especially relevant.

Apparent average consumption of tomato
Kg divided by population[4] *(UE-25 plus Switzerland and Norway)*

Country	Kg/per.	Country	Kg/per.
Austria	13.22	Lithuania	4.34
Belgium	21.80	Luxembourg	9.53
Cyprus	51.11	Malta	37.01
Czech Republic	9.39	Netherlands	42.39
Denmark	16.01	Norway	10.36
Estonia	11.93	Poland	7.00
Finland	14.23	Portugal	87.53
France	23.06	Slovakia	11.83
Germany	11.89	Slovenia	10.63
Greece	155.40	Spain	66.99
Hungary	28.54	Sweden	15.66
Ireland	8.41	Switzerland	17.43
Italy	92.76	United Kingdom	16.66
Latvia	11.41		

Source: compiled by the author from data provided by FAOSTAT and COMTRADE

III. International commercialization of tomato

The European Union (at 15) is the main player in the international trade in tomatoes, making up respectively 60% of exports and 53% of imports, although, a large part of this Community trade is destined for later re-export, either within the Community borders or outside of them.

[4] In order to obtain this figure, the following operation has been carried out: (National Production – Exports + Imports) / National Population. Both in exports and imports, fresh and refrigerated tomatoes have been included (HS 0702), prepared tomatoes (HS 2002) and those in a sauce (HS 210320).

As has already been mentioned, in spite of the production being habitual in practically all of the countries in the world, many of them barely cover their home production, which is why large producers such as China or a number of other Asian countries are not very important with regard to the world export markets in this product.

Surprisingly, countries such as Holland and Belgium have the highest levels with regard to the volume of tomatoes exported, even when their figures as producers place them far from the leading positions (positions 29 and 62 in the ranking of world producers, respectively, although evidently, for much smaller national populations and, therefore, with a much greater surplus, on the margin in the trade or re-export that they carry out).

In both the European and world context, it is Spain, the country with the greatest proportion of national exports there is barely any re-export), with practically half of the products coming from Andalusia and, to a lesser extent but of enormous relative importance to the local added value, the Canary Islands and Extremadura (Badajoz).

On the import side, just three countries (USA, Germany and the United Kingdom) already make up two thirds of the total world trade. In relative terms of their re-export it is very little (only in the USA. is there any trade in both directions with Canada).

World trade in tomatoes
(Average 2002-2003 dollars and percentage)

Exporter	**Dollars**	**Percentage**	**Importer**	**Dollars**	**Percentage**
Netherlands	916,291,676	24.7%	USA	980,555,547	26.0%
Spain	792,627,632	21.4%	Germany	904,640,296	24.0%
Mexico	714,838,569	19.3%	United Kingdom	440,479,678	11.7%
Belgium	223,254,931	6.0%	France	312,018,431	8.3%
Canada	204,746,463	5.5%	Netherlands	192,883,271	5.1%
USA	167,862,220	4.5%	Canada	168,540,625	4.5%
France	157,125,408	4.2%	Italy	78,361,132	2.1%
Italy	145,199,584	3.9%	Sweden	74,721,682	2.0%
Morocco	105,602,902	2.8%	Belgium	69,125,854	1.8%
Turkey	54,567,380	1.5%	Russian Feder.	66,882,811	1.8%
Israel	44,644,000	1.2%	Austria	49,655,479	1.3%
Jordan	21,603,631	0.6%	Switzerland	49,395,814	1.3%

Source: compiled by the author and Comtrade

III.1. Exporters

Now looking at a more precise measurement of the export flows according to the geographical areas towards which they are carried out, it is important to highlight especially the almost total concentration towards a country as is the case in exports from Mexico (99% is destined for the USA.) and Morocco (87% goes to France). To a lesser degree, because of its limited level, it is also worth highlighting the re-export from the USA to Canada as well as the geographic concentration of Israeli tomatoes to the British market.

Again we must highlight the very limited role played by the eastern European countries in the international trade in tomatoes. Only the Russian Federation presents significant values, mainly provided by Belgium, France and Holland, but they are always residuary markets even for these exporters.

Main Export Markets for Tomatoes of Each Country
(Sum 100% by row)

	Importer							
Exporter	**France**	**Germany**	**Netherlands**	**United Kingdom**	**Other EU**	**USA**	**Canada**	**Russian Federation**
Netherlands	2.8%	46.1%		22.0%	14.7%	5.8%	0.4%	1.6%
Spain	17.0%	25.9%	17.9%	23.8%	3.9%	0.4%	0.1%	0.5%
Mexico		0.0%	0.0%			99.4%	0.6%	
Belgium	21.6%	53.3%	10.1%	3.9%	11.1%	1.3%	0.5%	3.0%
Canada	0.0%					100.0%		
USA	0.1%		1.6%	0.5%	0.0%		94.7%	
France		40.6%	5.2%	9.2%	17.4%			4.8%
Italy	5.8%	58.4%	2.0%	6.8%	10.6%		0.0%	0.1%
Morocco	86.7%	0.4%	0.3%	0.0%	10.9%		0.0%	3.0%
Israel	1.7%	10.8%	28.1%	34.5%	5.3%	13.3%	0.2%	0.4%

Source: compiled by the author from data provided by COMTRADE

With regard to the commercial re-export trade, a significant activity of this type can be estimated in some markets. In particular, and for the whole world, two cases stand out: Holland and Belgium, wholesale providers from Germany, mainly from imported production. In the case of Canada, a large part of the goods going to the United States is contracted by agents from this country, although they do not pass directly through it territory.

	Exports	Imports	X – M
Belgium	223,254,931	69,125,854	154,129,077
Canada	204,746,463	168,540,625	36,205,838
Italy	145,199,584	78,361,132	66,838,453
Netherlands	916,291,676	192,883,271	723,408,405
USA	167,862,220	980,555,547	-812,693,328

When starting to determine the prices of international transactions, it is worth commenting on the enormous dispersion that there is in the export price according to the different exporters even in the same area. The coexistence of these differentials with sales carried out is a new sign of the different appreciations of quality of the tomatoes commercialized and the seasons of the year in which external sales are made. This is absolutely essential in countries with high tariffs, such as the European Union.

The different seasonal tariff settings make little difference to the average annual prices which, perhaps can only be considered as varying rates in order to set out an evolutionary trend in the reduction in the price of tomatoes, in spite of the prices during a certain period possibly being greatly ed by the climate and as for the rest of the agricultural production, the exact evolution of the prices could be extremely chaotic.

Of course, the comparisons only make sense when attention is paid to the markets (by source) coexisting in the same month, as for example, is the case for different periods for both the Spanish and Moroccan tomato, or those from Holland and Belgium, etc. Looking at this type of analysis, the small persisting differences with regard to prices must be factors mainly in the transport costs and the different perceptions of quality in the destination markets.

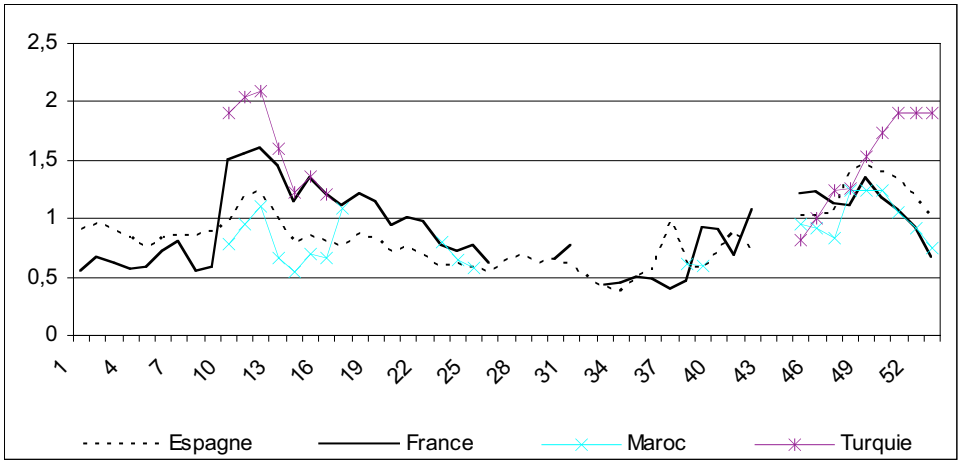
Average Export Prices of the 10 Greatest Exporters in the World
(Dollars per kilo)

	1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Netherlands	1.26	1.08	1.18	1.07	1.12	0.95	1.20	1.47
Spain	0.88	0.73	0.78	0.69	0.73	0.63	0.80	0.92
Mexico	0.72	0.76	0.72	0.80	0.67	0.70	0.75	0.96
Belgium	-	-	-	-	1.06	0.91	1.11	1.36
Canada	1.79	1.64	1.68	1.53	1.63	1.61	1.74	1.78
USA	0.79	0.87	0.92	0.82	0.87	0.83	0.93	1.06
France	1.14	0.90	1.00	0.85	0.98	0.80	0.94	1.09
Italy	1.06	0.87	0.98	1.00	1.08	1.03	1.27	1.50
Morocco	0.54	0.48	0.51	0.51	0.49	0.40	0.50	0.66
Israel	2.13	2.22	2.10	2.41	1.90	1.20	1.80	1.68

Source: compiled by the author from data provided by FAOSTAT (unit value indexes)

Thus, a good example is the wholesale market in Rungis in Paris in 2004 in order to contrast the very different prices for the same type of tomato (*round tomato Cat I 57/67*) coexisting at the same time in the market to cover different types of demand.

Wholesale prices in Rungis (Paris, Francia) of the *"Round Tomato"* according to origin
(Weekly Price in Euros per Kg, year 2004)

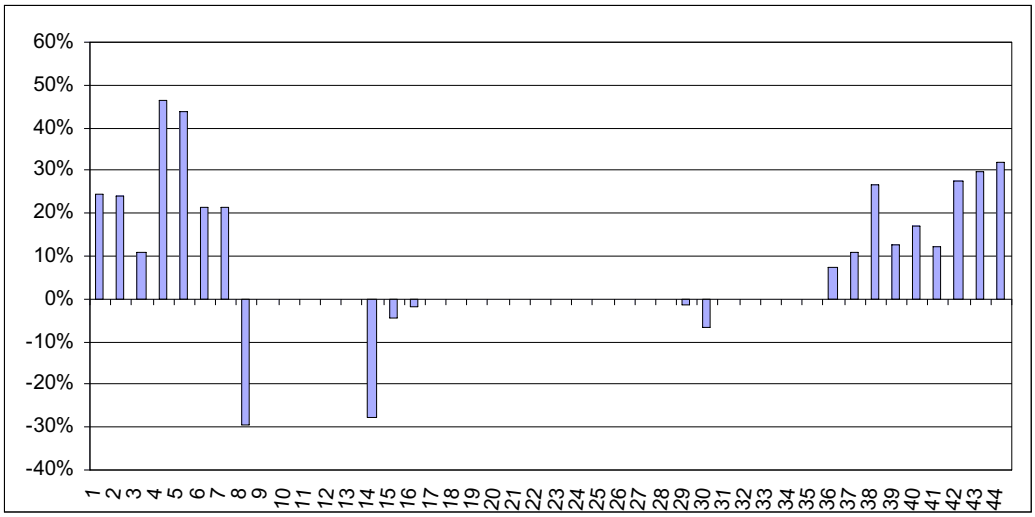


Source: Service de Politique Economique et Internationale. Service de Nouvelles des Marchés

Looking at the data from the graph above for the sales of tomatoes in France coming from Spain and Morocco, the following can be seen: of the twenty-two weeks in 2004 in which there were both bidders in the French market, only in four of them was the Spanish tomato cheaper than the Moroccan ones (on occasions up to 30% lower in price). In the remaining eighteen months, the Moroccan product was up to 30% cheaper

(at the beginning of the year), between 5% and 10% in the summer and around 20% in the other months of the year.

Differences in the Spanish tomato price – Moroccan tomato price
(Weekly percentage difference in the year 2004)



Source: compiled by the author from data provided by the Rungis Market (Paris)

The object of this example is no more than to illustrate numerically the differences perceived by the consumer in the reference market, which in the face of tomatoes of identical technical characteristics, assumes a significant differential cost, probably according to other elements not related to the tomatoes themselves: preservation, designation of origin, packaging, etc.

III.2. Importers

The enormous world power in the purchase of tomatoes is the United States, which is mainly provided by Mexican Market and from Canadian re-export. Adding Germany, the United Kingdom and France to this country we have more than 70% of the world import trade.

For the remaining countries that have just been highlighted as importers, the most relevant figures referred to Holland and Belgium refer to tomatoes bought basically with the intention of re-export, although their productive levels are not low in terms relative to their populations. Spain, for its part, is the provider with most weight in

almost all of the European countries, as it is those that later resell the goods or directly to the final consumer.

Main Import Markets for tomatoes in each country
(Sum 100% per row)

	Exporters									
Importers	**Belgium**	**Canada**	**France**	**Italy**	**Mexico**	**Morocco**	**Netherlands**	**Spain**	**USA**	**Other**
USA	0.3%	20.9%			72.5%		5.4%	0.3%		0.6%
Germany	13.2%		7.1%	9.4%	0.0%	0.0%	46.7%	22.7%		1.0%
UK	2.0%		3.3%	2.2%		0.0%	45.8%	42.9%	0.2%	3.6%
France	15.5%	0.0%		2.7%		29.3%	8.1%	43.1%	0.1%	1.2%
Netherlands	11.7%		4.2%	1.5%	0.0%	0.2%		73.5%	1.4%	7.5%
Canada	0.6%			0.0%	2.5%	0.0%	2.1%	0.4%	94.4%	0.1%
Italy	5.0%		15.8%			0.4%	51.5%	27.0%		0.2%
Sweden	2.7%		0.7%	0.9%		0.0%	81.2%	13.0%	0.0%	1.5%
Belgium			25.9%	2.5%		0.5%	34.3%	29.0%	7.1%	0.7%
Russian F.	9.9%		11.2%	0.1%		4.7%	21.5%	5.7%		46.8%
Austria	5.7%		10.1%	41.2%	0.1%		12.3%	20.7%		9.8%
Switzerland	4.3%		32.2%	21.2%		11.5%	16.1%	13.6%	0.1%	1.1%

Source: compiled by the author from data provided by COMTRADE

It is important to comment that, although its volume is not sufficient to place China among the top tem tomato exporters, it is a significant provider to foreign markets. Specifically, it has sales points in the Russian Federation, in Scandinavian countries, in regions in southern Africa (Cape Town, etc.), East Asia and Australia. Clearly, transport costs make this country very competitive in its area of geographical influence (Asia and Oceania) and equally as expensive in extreme areas of Europe or Africa.

IV. International commerce in tomato in the European Union

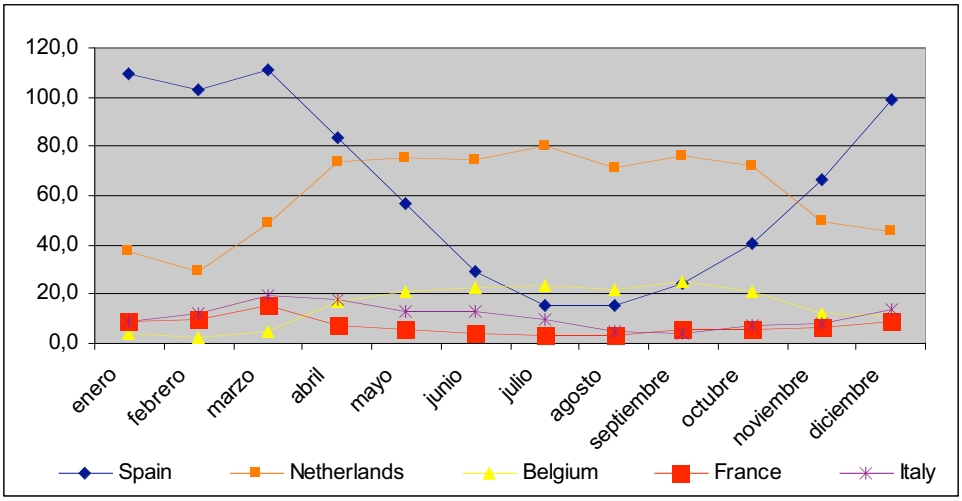
IV.1. Internal competition -EU: Spain, Holland

When analysing the European market, it is fundamental to take into account the seasonal variations in the flows in order to determine when there is real competition between exports from other countries.

Within the European Union itself, the countries with genuinely foreign sales are Spain, Holland, Belgium, France and Italy, all with very different market quota proportions according to the months that are being considered.

Spanish tomato exports dominate the early market; that is, the purchase of tomatoes for the E.U. in the first and last months of the year. The climate s for the crops from Andalusia in Spain mean that during this period the rest of the countries in the Union have hardly any production. This region corners practically all of the market quota, although a part is sold to Holland who, in turn, pass it on it to other European markets such as Germany.

Distribution of intra-UE imports



Source: compiled by the author from data provided by Comext (Eurostat). Average 2000-2004

In the middle months of the year, the clearest export power is Holland who, with clearly more reduced dimensions, shares the quota with Belgium and Spain. Both exporters really only share the market in sales to Germany, which in both cases makes up practically half of their foreign total. For the other half of the exports, while Belgium turns toward the French Market, Holland concentrates on the remaining countries of the European Union and especially on the United Kingdom, where it clearly substitutes Spain as country of origin in the previous months (although in part, we speak again of the re-export of hybrid tomatoes grown in Almería in Spain, although from Dutch seed).

IV.2. External competition – EU: Morocco, Israel and Turkey

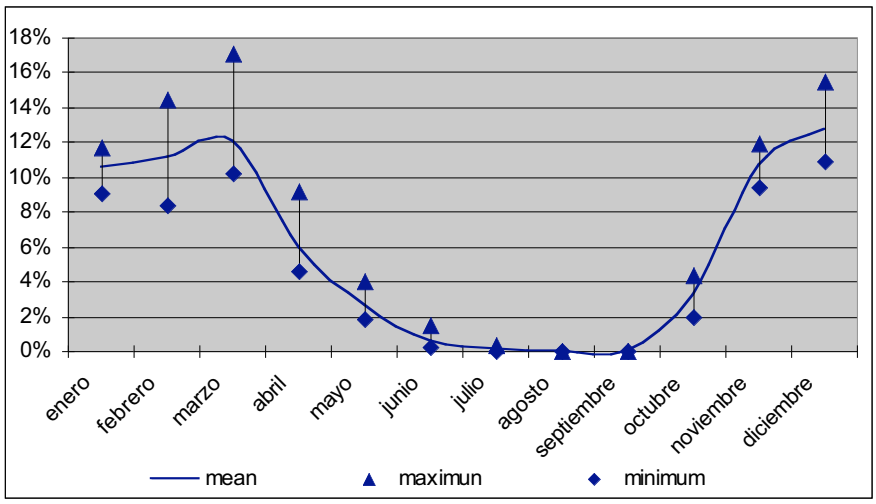
The main country of origin for non-Community tomatoes is Morocco, although in practice practically all of its sales are destined for the French and Swiss Market.

Because of the Moroccan climate s, almost identical to those of southern Spain, the niches in the market for its products are found in the early harvests, which include the periods of autumn and winter (from October/November to the end of March). We are clearly speaking here of an export market greatly ed by the current tariff protection structure, with its precise periodical quota system framework.

In any case, within the framework of the current Community protection system, Morocco would achieve a European market quota of around 12% during the period in which the tariff system allows the entry of the tomatoes into E.U. territory. Even so, at certain times, and as a result of the different characteristics of the crops finally harvested on both sides of the Mediterranean, the quota would have reached 18% in the first part of the year and 16% in the final months.

The effect of the quota system and the seasonal variations of the production in Morocco bring about a practically zero quota in the middle months of the year.

Market Quota in the EU for Moroccan tomatoes
Proportion of Imports Morocco / (Morocco + Intra-UE)

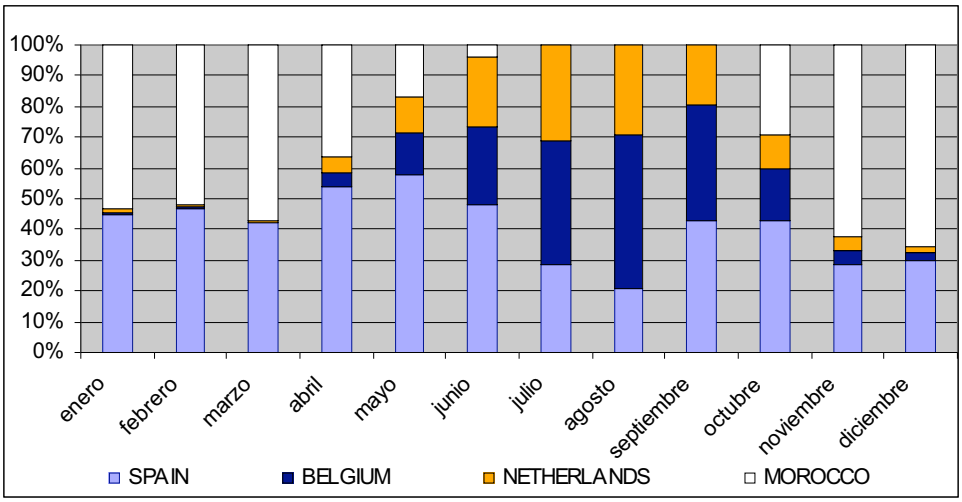


Source: compiled by the author from data provided by Comext (Eurostat). Average 2000-2004

As we have already commented on, excluding the summer months (July August and September) in which imports for Morocco is residual in July and zero during the remainder, more than 90% of Moroccan tomatoes are sold in France on average.

Obviously, the only country within the European orbit that might run into a possible conflict of competition is Spain. You can clearly see in the following graph the slight superiority of the Moroccan tomato in the market share found in France during the months from October to March, in which the second most significant country in the import of tomatoes is Spain. The North African tomatos literally oust the Spanish ones when both coexist in the French Market (for a deeper analysis of this, see Calatrava et Al. (2001)).

Market quota of French imports of tomato for each country



Source: compiled by the author from data provided by Comext (Eurostat)

Of course, and with a scenario of the progressive liberation of world agricultural trade and, therefore, in the European Union, the measurement of possible market incorporation on the part of Morocco is in line with its capacity for growth.

In this respect, in some usual analyses the profitability per hectare is compared (production among hectares cultivated) between one country and the same ration calculated for production in Andalusia, where 90% of the production is carried out under the maximum level of technological and quality standards at every stage (cultivation under plastic, hybrid seeds, drip irrigation, commercialisation process adhering to European standards of quality and preservation, etc.). Carrying out this comparison in the case of Morocco and that of Andalusia, where the number of hectares under cultivation are practically the same, it can be estimated that, with sufficient investment, the African country would be able to triple its current production.

V. World distribution chains for tomato

The chain of distribution for tomatoes is not homogenous throughout the different areas of the world; it varies even between the different producing and exporting countries. In any case, some particular determining factors and characteristics can be extracted from this market that has affected the production - distribution of tomatoes in the world in the last few years.

What is perfectly clear from all of the tables regarding foreign production and commercialization presented in this work is that the both the European and North American markets have cornered the largest part of the international trade in tomatoes, except in the case of "far off" areas in which China has a degree of local importance.

In both areas, Europe and the USA, the commercial trade in tomatoes is of special importance both from the point of view of national consumption and from the export or re-export function of the country to neighbouring areas, making them, on occasions, mere intermediaries in the distribution for the final consumption of the tomato.

When speaking about the distribution of tomatoes in import markets, several factors must specially be taken into account such as:

- The technical advances in preservation and transport.
- The possibilities of ripening off the vine.
- The packaging and quality requirements of each country.
- The consumption habits of the product in the destination country.
- The subjective preferences and labelling of designated origin, quality, etc.

In the last ten years, already having achieved the adaptation of the tomato to the particular tastes of some markets (with regard to, for example, colour and shape for the Anglo Saxon market), a large part of the research into hybrid seeds has concentrated on increasing the shelf life of the tomato or its ripening off the vine, thus allowing it a longer distribution time, therefore, increasing the distance over which it can be transported.

Together with the improved intrinsic characteristics of the tomato, it is necessary to combine the improvements in adapting them to the optimal preservation s in the large markets (both in the producers and the wholesalers), the evolution of packaging materials and the generalised use of cardboard for its classification and distribution (it is a cheaper material than the plastics used previously, storable and reusable) and the entry into the market of transport, even including air transport, after the significant reductions in prices in this sector throughout the world.

In another order of things, the habits of the tomato consumer in every destination country greatly influences the way in which it is distributed. The distribution chains are completely different in the European Union than in the USA, although a clear and overwhelming process towards complete integration is underway. While in Europe, the chains are made up of, to a large extent, large shopping centres (Carrefour, Royal Ahold, Metro, Wall-Market, Railvway, Intermarché, Edeka, etc.), in the USA. there are still small shopping centres dedicated to the distribution of fruit and vegetable, which includes, of course, tomatoes.

Within Europe itself, the consumption habits for the tomato also predetermine significant differences in the final distribution in the north (where the consumption of prepared tomato is common), as opposed to the south (where the main producers are located and the consumption of raw tomato is the norm).

In any case, concentration in the sector and the vertical integration vertical of the entire chain is a clear factor. So, approximately 60% of the distribution could currently be in the hands of large commercialisation companies or directly of the large hypermarkets.

This progressive concentration can assume great problems for the producers. As cited by Avermate (2000), this situation is affected by the following factors:

- The large chains consolidate their power in the producer – purchaser relationship creating a large imbalance in favour of the latter.

- Purchasing in large volumes allows them to homogenize and standardise the price of products of very different qualities.
- They exercise great pressure to reduce prices
- They modify the rules of “just in time” purchasing according to the observed needs.
- They make the producers extremely dependent on very few purchasers.

The positive aspect of a greater efficiency in the markets is that the dominance of the large integrated distribution chains brings about a clear homogenization of transport costs, which benefits the economies of scale as they share the fixed part with a large variety of other products contained together in the same batch.

On the other hand, the concentration in the number of suppliers (the number of integrated chains) has as a consequence a clear improvement in two aspects: (i) there is a considerable increase in the phytosanitary measures demanded in order to differentiate them from their competitors and (ii) they make significant investments in logistics, the treatment, packaging and classification of the product, which in any other way would be much more expensive.

Given the circumstances, in the following table you can appreciate (and omitting some of the trade within the country itself), the international flows show very uniform costs between the origin and destination, almost classifiable as medium or large, in such a was that the total cost per ton varies in the former (medium distances) to around 45-55 Euros, as opposed to costs of between 60 and 70 Euros for “long distances” (all costs referring to cost per metric tonne of tomatoes).

Estimated transport const for some commercial routes for tomato
(Euros per Metric Tonne, except UK, pounds)

To …	From …							
	Chile	France South	Greece	Iran	North Italy	Portugal	Spain	Turkey
Alexandria (Egypt)								30
Antwerp / Rotterdam	58		45			30		30
Bangkok (Thailand)	48							50
Belgium / Holland		40			60	65	65	50
Copenhag (Denmark)								40
Felixstowe (pounds)					40			
France North		25			55	55	55	55
Belgium / Holland			70					
France South		20	60		35	45	45	45
Germany Central		60	70		45	70	70	60
Gutenberg (Sweden)								35
Hamburg	75			65				
Hamburg / Felixstowe			45			30		30
Heisenberg (Sweden)								40
Jakarta (Indonesia)								45
Kobe (Japan)	48							45
Manila (Philippines)								50
Marseille				55				
Oslo (Sweden)								40
Port Keelang (Malaysia)								45
Pusan (Korea)								40
Singapore	50							40
Stockholm (Sweden)								40
Tripoli (Libya)								60
UK (Manchester, pounds)		60	60		70	50	50	45
Veracruz (Mexico)	60							
Yokohama (Japan)	50							

Source: Tomatoland, June 2004 and Comext CIF – FOB estimations

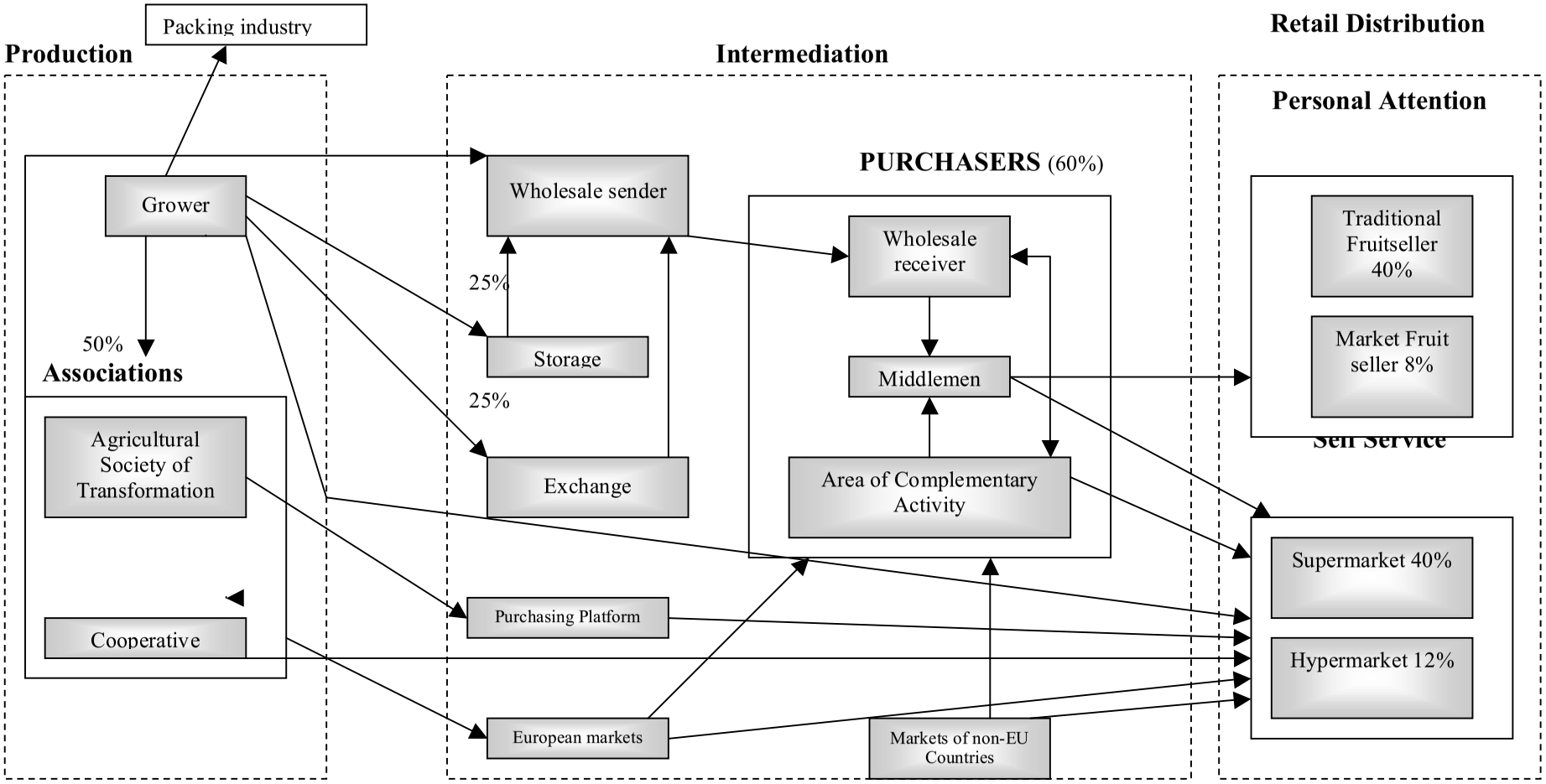
The complete distribution process for tomatoes in every producing country follows a very similar structure as detailed in the appendix for Spain, although the percentages assigned to each means of final distribution can vary considerably. In any case, this graph is reproduced in order to represent succinctly the case for practically every country in the south of Europe.

To close this section, it is important to underline the role played by China as an exporter to some of the remotest places on the planet. Clearly, the costs associated to the very long distance distribution are enormous, but acceptable for the price of the tomato in these distant areas. The associated transport costs are between 80 and100 dollars per tonne, as the preferred destinations are the Scandinavian countries, South Africa,

Oceania, San Petersburg, Arab countries, etc. In a practically symbolic way, Chinese tomatoes enter the European markets (through Dutch ports) and even to America (New York).

Finally, we want to highlight that the relative importance of the distribution of Moroccan tomatoes in the European context demands, by itself, a separate article about it. It is included in this research from field work carried out by José Ángel Aznar incorporated into the current research from FEMISE III.

APPENDIX – PRODUCTION CHAIN – INTERMEDIATION – RETAIL DISTRIBUTION OF TOMATOES IN SPAIN



Source: The Spanish Ministry of Economy, January 2004

VI. Summary and final consideration

The production of tomatoes is usually in the greater parts of those countries that have areas appropriate for this type of production (irrigation, temperate climate), making it easy to find different varieties at multitude of latitudes, although frequently, hardly enough for home consumption in the country itself.

Although the agricultural surface destined for its production of the product we are referring to is 0.5% of the total surface and average for the world total, in some specific countries its relative importance is much greater (usually around 5%-8% at a national level, and if we go down to a regional level of the main producing countries, up to 25% of the area cultivated – for example in Morocco, Turkey, Spain, etc.). In any case, it is important to say that this surface is difficult to quantify as, in many of the territories, the cultivation of tomatoes takes place together with other vegetables such as pimientos.

For the world total, we can talk of an average annual production of tomatoes of around 100 million tonnes a year, where China is the world's greatest producer (21% of the total) and the 25 countries of the European Union (15%), although there are clear differences in both areas with regard to their performance in the world market for the product, where Europe comprises, on its own, more than two thirds as a seller. In similar figures we find ourselves added to the USA and the EU from the point of view of imports. Definitively, with regard to the international acquisition of tomatoes, we can talk of a strong connection this and the income per capita of the country.

In any case, the rate of potential growth for this product is exponential: in some analyses the use is compared to the profitability per hectare (production between cultivated hectares) between one country and the same ratio calculated for the Andalusian production, where 90% of the production is carried out to a high level of technology and quality in all of its phases (cultivation under plastic, hybrid seeds, drip irrigation, the commercialisation process with European standards of quality and preservation, etc.). Making this comparison for the case of Morocco and that of Andalusia, where the hectares coincide almost identically, it can be estimated that, with sufficient investment, this African country could triple its current production.

As well as the production, it is necessary to consider the slow growth in the potential demand for tomatoes in the more developed areas: EU-15 and the USA, where it is not feasible to increase the current consumption *per cápita* significantly. Under these circumstances, and without tariff protection in the market as in that of the tomato, it is to be hoped that an effect of "partial substitution of the market" instead of "market creation" in the case in which there is a free trade area. To this there is also the contribution of a growing homogenisation in the product from different origins, the reduced additional amount in transport costs in non-EU competitors, the role developed by distribution chains integrated in market standardisation, etc.

The enormous role of the EU in the international trade in tomatoes and the specific weight of several – non-Community Mediterranean Countries in it (Israel, Turkey and, mainly, Morocco) make this specific study into the commercial policies of special interest within the framework of the trend towards the liberalisation of agricultural trade in the Mediterranean basin and the WTO agreement.

Within the framework of friction in international trade between the EU and Morocco, the possible ties are almost exclusively with Spain, on the other hand, the second largest country in the world with weight in the tomato export market (21% of the world total). The coincidences in seasonal sales, thanks to the early production of the product; in relatively similar costs (except for manpower and the technology involved in the process) and in the objective markets the rest of Europe and, especially, France) make it essential that any negotiations on this product take Spain especially into account.

In spite of all that has been said in this article, reference has been made to the relative advantage of the European – Spanish product on its entry into certain European markets. The possibility is stated of the coexistence of the enormous differences in the price of tomatoes which are, in principle, similar. With this, the differences perceived by the consumer in the reference market are realised. The consumer faced with a tomato of equal technical characteristics assumes a significant differential cost, probably according to other elements not related to the tomato itself: preservation, designation of origin, packaging, etc.

In another order of things, the facet of changes in the final distribution of the tomatoes in the world has undergone enormous changes in the past ten years, rapidly converging towards models of “integrated distribution chains” with the subsequent advantage (standardisation of products and greater attainability for the final consumer) and disadvantages (increase in imbalance in the producer – seller relationship by volume of purchasing and low diversification of the demand).

As a first conclusion, it is important to point out that the analysis must concentrate on a detailed study on some specific market circumstances such as price differentials, the characteristics perceived as seasonal “quality” of the production and tariff regulations for each month of the year as well as the characteristics of its distribution.

In the second place, it is important to agree that, although there is a consensus on the relative advantages of a transparent international market with little intervention and leading to a areas of free trade, also agricultural; we must not forget that there can only be one objective in the medium term, whose implementation must carefully measure both the benefits and the negative aspects. In the product chosen, tomatoes, this circumstance is of special importance for specific nations: Morocco and Spain, for which we must concentrate on a detailed analysis of the policies for that purpose.

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THE TRADE AND EXPORT SYSTEM OF MOROCCAN FRUIT AND VEGETABLES

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The significant development of fruit and vegetables production and export in Morocco over the past 10 years has made it the foremost non-European Union supplier of fruit and vegetables in the European Union and the most important supplier in France; ahead of Spain. At the beginning of the 1970s the Moroccan horticultural sector went through a deep quantitative and qualitative transformation with the arrival of foreign (mainly French) investors and the change from open-air cultivation to cultivation in greenhouses[5]. A large part of Morocco's fruit and vegetable production (mainly tomatoes) now takes place in greenhouses. This has greatly increased both the yield and quality of the produce in response to the greater demands from external markets. As in Spain, it also enables producers to take advantage of being able to offer fresh fruit and vegetables at those times of the year when other European producers are unable to do so.

Alongside the growth and improvement in fruit and vegetable production, there has been a considerable development of exports which have shown sustained growth over the last 10 years. Together with the increase in fruit and vegetable exports, great step forwards have been taken in the trade system by setting up a complex network of agents. The objective of this paper is to describe the Moroccan trade system for fruit and vegetables and the agents involved in it.

BACKGROUND

Until 1986, the organisation of foreign fresh fruit and vegetables trade was in the hands of an official body, the Office for Commercialisation and Export (OCE). The State created this office in 1965 to oversee the promotion of agricultural exports, organise improved transport conditions and develop a brand identity. The creation of this body put an end to the abuses committed by private exporters (the majority French),

[5] For an analysis of the transformation of the Moroccan intensive fruit and vegetable sector and its future prospects, see Aznar Sánchez (2002a).

especially the non-repatriation of a significant amount of foreign currency. The OCE had to put an end to the exporters' excesses committed up until then and to take on the responsibility for a combined strategy of developing the sector, organising foreign trading plans and researching new markets (El Hadad, 1995).

Its work was three-fold: technical and qualitative production control, processing and export; regulation; and the organisation of foreign fairs and exhibitions. Provided with considerable powers, far beyond the role of a simple commissioning agent, it was put in charge of the strategic areas of the horticultural sector in which private operators were unable to take on the risks in order to create a technical environment favourable to export competitiveness. Thus, the action of the OCE was extended throughout the entire chain, from production to arrival at the target market[6].

The monopoly on the fruit and vegetables trade in foreign markets allowed the achievement of economies of scale, the unification of supply and the development of an aggressive communications policy, and finding new openings for the produce of small fruit and vegetable growers. However, there are significant disadvantages to the way this body operated[7].

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[6] In the area of production, it promoted a rationalisation of varieties provided technical assistance, anticipating inputs, etc. In the area of processing, it was in charge of purchasing the packaging. In the area of transport, it organised the chartering of boats. In the area of control, it tested the quality of the products exported in order to respond to the demands and regulations of the importing countries. And in the commercial area, it was responsible for sales in external markets, making contact with a number of importers in the target countries and with whom they set up an agreement for exclusive rights in exchange for a commission.

[7] Khalid (1997) highlights the following difficulties: the producers are not encouraged to improve quality, given that they were remunerated at the same price without taking into account the quality of the product; the delay in paying for the exports created liquidity problems especially for smallholders as they usually had to wait four or five months from the date of delivery; the lack of transparency in the information provided to the producers; the provision of packaging was centralised under the control of the OCE, which made it difficult to make a claim to the provider with regards quality or delivery dates; sales in external markets was carried out globally at a predetermined average fixed price in such a way that the commissioning agents lacked the flexibility to tackle foreign competition; rather than foreseeing favourable moments for exporting, more attention was paid to the shipping of the goods as it was arriving without any kind of forward planning; there was no direct contact with the buyer so the producers were not made aware of their demands, their means of replying were late and they were unable to reach a mutual understanding in their relationships; the majority of transactions in the external markets took place through traditional methods (sale in the ports to commissioning agents); the excessive bureaucracy, the slowness of administrative procedures, abuse of power, corruption, etc.

Within the framework of the Policy for Structural Reform of the agricultural sector undertaken by Morocco from 1983, the State decided to end the monopoly of fresh fruit and vegetables export in 1986 on the "recommendation" of the World Bank[8]. From that moment, the OCE acted like any other export group, providing a minimum service – especially to small fruit and vegetable growers.

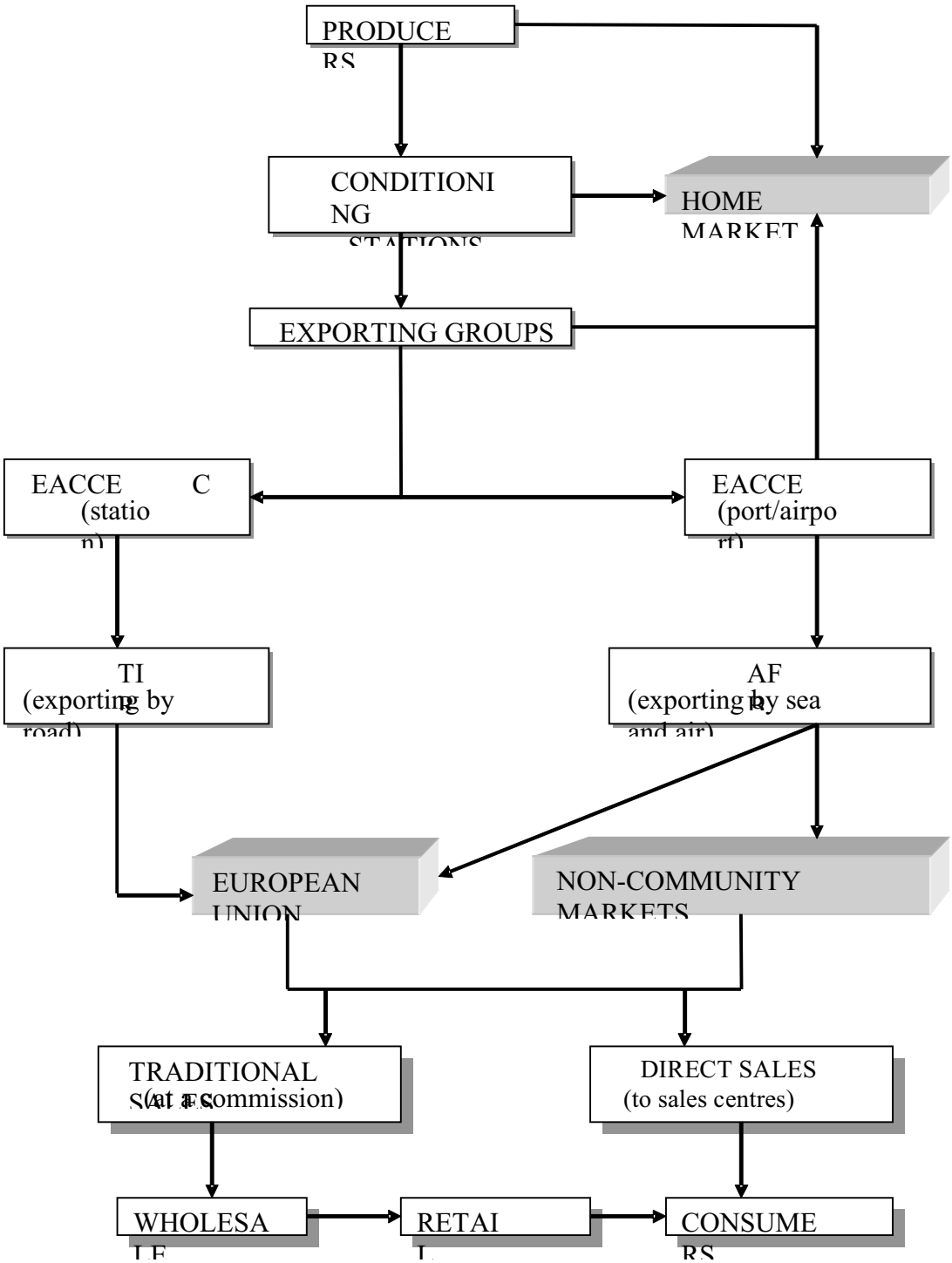
THE TRADING SYSTEM

After the OCE disappearance, new operators emerged in the fruit and vegetables trade system. The distribution chain and the agents that are now involved in the Moroccan fruit and vegetables trade are detailed in Graph 1.

On the one hand, the home market appears as an accessory market for: (1) fruit and vegetable producers, unable to reach the levels of quality required by the foreign markets; (2) rejected goods in the processing centre phase; (3) rejected goods in the control phase of the Autonomous Establishment of the Control and Coordination of Exports (EACCE); and (4) exporters' goods at those times of the year in which the transportation of fruit and vegetables to foreign markets becomes difficult or when the home market offers sufficiently high prices.

GRAPH 1. CIRCUIT AND AGENTS IN THE TRADING SYSTEM OF FRUIT AND VEGETABLES FROM MOROCCO

[8] For an analysis of the basic areas of agricultural policy undertaken by the Moroccan government, as well as the measures and reforms that have been adopted in order to achieve a greater liberalisation and opening up of the agricultural sector, see Aznar Sánchez (2002b).



SOURCE: Drawn up by the author.

On the other hand, the foreign market constitutes a fundamental objective for fruit and vegetable producers that obtain quality products by offering much higher prices. The fundamental unit in the exportation chain is the processing centre that joins

together several producers. In turn, one or several processing centres can be organised to make up an export group. The Autonomous Establishment of the Control and Coordination of Exports (EACCE) is in charge of quality control of the exported fruit and vegetables (in the centre itself when the consignment goes by road and at the port or airport when the consignment goes by sea or air). The Atlas Fruit Board (AFB) is in charge of organising the sea or air logistics as well as the management of exports into non-European Union markets[9].

HOME MARKET

This market is supplied with products from different sources:

Produce from non-exporting fruit and vegetable growers and those not affiliated to the processing centre.

Produce of the exporting groups at those times of the year when there are difficulties in foreign markets and when it is considered more profitable to sell to the home market by offering sufficiently good prices.

Produce that has been rejected during the processing phase in the centres or in the EACCE control phase.

In accordance with these three factors, the percentage of the production sent to the home market can fluctuate considerably, although it had been around 60 per cent over the past few years. The points of sale for these products are very diverse: direct from the farm, in the processing centre, in wholesale markets, in weekly markets or shops located on the road side. The chosen point of sale depends on several factors such as the availability or not of means of transport, the need for liquidity, the amount of sold product, etc.

According to the product and type of producer there are certain peculiarities. So, for tomatoes, the grower that produces in greenhouses generally decides to orientate its production to the foreign market; while the grower that cultivates in the open air is almost obliged to sell its produce in the home market. In the case of *pimiento* (sometimes known as red green or yellow pepper), the majority of the production is taken up in the home market as the prices offered are worthwhile and both the quantity and quality obtained is very limited.

[9] As a result of a series of problems arising between the exporting groups which make up the AFB, a division came about at the end of the 1990s from which two organisations were formed (FFM - Fresh Fruit Market and MFB - Maroc Fruit Board) which carry out the same functions.

Considering the grower type, an inconsistent behaviour can also be seen. The medium and large growers direct the bulk of their production to the foreign markets and consider the home market as an eventual alternative only for that part of their production that does not come up to the levels of quality and at those times of the year when there are problems in the foreign markets. In spite of the subsidiary nature of the home market, it is not only limited to finding an outlet for this production, but also to trying to obtain the best price possible. That is why, when they have their own means of transport, if they consider that prices in the wholesale market in Agadir are insufficient, they sell their produce in other cities of the country (Marrakech, Casablanca, Safi, etc.). On the other hand, the small growers who cannot access the export market have to sell their produce in the home market under much worse conditions. Some of them sell to wholesale markets in the region, but most of them (devoid of means of transport and storage and undergoing liquidity problems) are forced to sell their produce under exploitation, finding themselves at the mercy of intermediaries.

The obtained prices vary considerably according to the place in which the products are sold and the time of the year. There are occasions when, as a result of shortages in the home market, prices become very high, even higher than those of the foreign market. On the other hand, at the end of the exporting period (May and June), prices usually come down a fair amount because produce that cannot be exported arrives on the home market. In spite of these large variations, sale prices on the home market remain conditioned by the state of the foreign markets[10].

In contrast to the well-structured fruit and vegetable export chain, the home market is characterised by a notorious disorganisation that gives rise to complex channels of distribution with the presence of numerous unregulated intermediaries with no collective discipline for the profession (Attioui, 2000). The majority of these intermediaries provide little added value, but by successively incorporating margins they increase the cost for the consumer as well as substantially limiting the grower‘s profits. As a consequence, the end price is the result of the sum of the margins imposed by the intermediaries rather than the result of the application of supply and demand rules.

[10] Ait el Mkadem (1998) verified the link between the home and foreign market prices. They varied in the same way throughout the exporting season (November to April). Specifically, he showed the direct relationship between the price of tomatoes in the French market at Perpignan-Saint Charles (the main distribution centre for Moroccan tomatoes in Europe) and the wholesale market in Agadir.

The wholesale fruit and vegetable market, just like the other markets in the country, are characterised by:

- a multiplicity of operators;
- an archaic reception and processing infrastructure;
- the lack of regulation for the produce trade;
- numerous handlers and change of packaging;
- the absence of working regulations in which the rights and responsibilities of the different users are set out;
- the random nature of opening and closing times;
- the inexistence of an information system to handle the paid prices and sold volumes.

The consequences of these malfunctions and holes in the organisation of the home market are very high losses and transaction costs which penalise both the consumer and the producer. The former pays dearly for produce of variable quality, which complicates the development of the consumer market. The latter is hardly remunerated, which creates a disincentive to continue investing or increase investment in the production of fruit and vegetables.

Faced with this situation, the Association of Producers and Exporters of Early Fruit and Vegetables from Morocco (ASPEM), has established the following measures for fruit and vegetable production sold in the home market so that it is better remunerated:

the organisation of supply and the integration of producers into the trading circuit;

progressive regulation in production;

the reorganisation of the wholesale markets in the area of infrastructures, management, modalities and type of evaluation, tied to the perceived model of rendered services;

the regulations review of governing trade within the home market;

the setting up of a “transparent” information system showing the sold quantities and paid prices.

PROCESSING AND PACKAGING

Before departing for their target markets, fruit and vegetables undergo a series of treatments to ensure that they arrive in perfect conditions. These operations are crucial

in the exportation of Moroccan fruit and vegetables because the produce may have to travel over 2,000 kilometres in order to reach the European markets. But as well as maintaining the quality of exported fruit and vegetables, these treatments allow the incorporated added value, and thus the profitability, to be increased.

The processing and packaging facilities carry out a fundamental role:

A technical role, as they are the providers of the processing and packaging services for fruit and vegetables – operations through which the maintenance of the quality of the produce is sought, as well as its good presentation, in order to improve its commercial value.

A role of intermediary between the growers and the exporting groups. This job of intermediation is extended to the provision of information, to the making of payments and to the exports programming.

Also, in some cases the processing centres can be in charge of the cultivation techniques dissemination and the packaging of fruit and vegetables as well as carrying out a limited commercial mission of selling produce rejected in the processing stage.

The processing centre is an obligatory stage for producer's goods to reach the exporter. The relationship between the producers and the processing centres are three-fold:

The producer sells his production to a private centre;

The producer is a member of an organised centre set up as a co-operative;

The producer owns his own centre to processes their produce and in which other growers' fruit and vegetables can be prepared.

The large growers usually own their own processing centre, while the more modest ones usually have to rely on the services of the centres owned by the larger growers or organisations exclusively dedicated to the provision of processing and packaging services. Throughout the year the producers have to hand over collection to the processing centre with which they have signed an exclusivity agreement, but at the end of the season they can change centres if they think it necessary. In this case, the loyalty of the producers to the centres is usually fundamental to a better price-quality relationship.

The most usual legal format is a limited liability company or a co-operative. The former takes place when a large grower creates a processing centre for the processing of his own produce and that of other growers. The latter usually occurs

when a group of small/medium-sized growers get together to create a centre to process their own produce and that of other growers.

The control of services offered by processing centres is carried out by EACCE, which supervises the condition of the premises, the processing and packaging material, health and hygiene conditions, and so on. This body has also carried out a fundamental role in the modernisation of the facilities, since the legal requirements for the average processing capacity increased. It has gradually managed to eliminate the smaller centres and replace them with other newer ones with greater capacity and more advanced technology.

There are currently about 40 fruit and vegetable processing centres with varying degrees of technology. The larges ones (belonging to exporting groups with the backing of foreign capital) are of a technological level similar to that in Spain, with a high degree of automation and the most modern machinery. They usually use specific lines for each type of produce, mainly due to the very large amounts of fruit and vegetables to be processed. The majority are ISO 9001-certified for the quality of their facilities and services. On the other hand, the smaller processing centres use simple lines of conveyer belts basically put together which bring the produce to the operators who manually carry out the selection and categorisation. Those centres with automatic lines are provided with electronic calibrators which select the produce only by size. The majority do not have the specific machinery for each kind of produce, so they rely on centres that allow the processing of several types of produce because of the small amount of handling required for each of them. Resulting from an imposition of the EACCE, all centres have cold rooms for the storage of produce.

The packaging is essential for the produce protection and transport; it is also an element in the commercial communication of the company. Regarding its physical attributes, the destination distribution companies are making more and more demands on the characteristics of the packaging in order to simplify its operation, assuring the stability of the stacking, optimising the volumes and weights (Osset, 1999). Non-returnable packaging is most commonly used in the Moroccan fruit and vegetables trade, with 85 per cent of the packaging being made of corrugated cardboard, followed way behind by wood, which makes up eight per cent of the packaging, and plastic, which is of marginal significance. Corrugated cardboard is used for several reasons: its price is very competitive, it is much easier to recycle, it weighs less, it is foldable, it is very versatile and adaptable for any type of produce, it is easy to print on, its strength

and permeability has been improved, and it has been adapted to fit the European regulations for palletisation (AFCO Regulation Platform), which has allowed it to continue winning market share against its most direct substitute (wood packaging).

QUALITY CONTROL

The assessment of quality control for the fruit and vegetables to be exported is of great interest, because the quality of the produce and respect of the technical regulations have become essential components for access foreign markets (Sánchez Martorell, 1995). After having finished the OCE's monopoly in 1986, this body became just another exporting group, so that it could no longer be both judge and jury. The State decided to withdraw the administration of quality control of the exported produce and created an autonomous service co-administered by both the government and the profession called "The Autonomous Control and Coordination of Exports Establishment" (EACCE). With the setting up of this body, the State and the exporters assured the neutrality and objectivity in the technical control and also put it in charge of the exports co-ordination.

The EACCE was therefore assigned two important functions. First, the technical control of the produce to be exported in response to the regulatory demands and guidelines of the importing countries, as well as assuring compliance with the compulsory provisions related to health protection[11]. Second, the activities co-ordination of different exporters in order to adapt the Moroccan supply to foreign demand. The idea of these functions is to improve the brand image of Moroccan produce in foreign markets together with the development of market share.

The action of the EACCE is developed simultaneously in five areas:

Study of fruit and vegetables production and export in Morocco and competing countries and analysis of the capacity state for absorption in foreign markets. The results of these reports are sent regularly to the growers and exporters, making up a database on which the exporters support their export strategy.

[11] The EACCE has three laboratories at its disposal to analyse the products from Agadir, Berkane and Casablanca; and another for the control of packing and packaging in Casablanca. These laboratories have recently been accredited by the European Union through the (EU) Regulation nº 1791/2002 of the Commission on 9 October 2002.

Normalisation of the produce and packaging for export, continually providing information on all of demanded regulations by foreign markets relative to the dimensions, calibre, packaging, and so on.

Control and assurance of processing and handling tasks, inspecting the material and the facilities. It also carries out a wide-ranging assurance and advice campaign on techniques and methods to guarantee higher quality.

Export qualitative control. The essential objective of this action is not to allow produce to leave the country that does not come up to the regulations demanded by the end-user market. The inspection is carried out in different places once the goods have passed through the processing and packaging stage. If the exportation is carried out by sea or air the control takes place in the delegation established at the port or airport; while if it is by refrigerated lorry, the agents of the EACCE go to the processing centres. Exported produce control and follow-up continues to the destination where the EACCE has technical delegations that send, in real time, reports on the state of the goods upon arrival at the target market.

Export activities coordination trying to adapt quantitatively to supply the demand of the foreign markets through the short-term control of departures and their location. Through on-the-ground surveys and information provided by the professionals, the agents of the EACCE determine the importance and period of harvesting. These elements, along with statistical information on the forecasts and fulfilments in Morocco and on the competition, serve as a basis upon which to establish the forecasts that allow the export campaign to be prepared as well as harmonising the action of the exporters regarding the division of the markets, transportation timetables, and so on.

Compliance with the regulations on maximum limits on waste is subject to a rigorous control on the part of EACCE. Some of the exporting groups are adding however an extra step to guarantee the quality of their produce and have set up a process of international certification (EUREP-GAP certification). At the moment, only the large exportation groups with foreign-capital participation have set up this certification.

LOGISTICS

Fruit and vegetables transport takes place by means of two routes: one, from the production place to the processing centre; the other, from the centre to the foreign market. For the first route, the transport is generally carried out by the grower through his own means (small lorry, car with trailer, tractor, etc.); and the second one can be

carried out by land, sea or air. In the case of air or sea transport, the processing centre contracts local transport companies to transport the goods to the port or airport of departure, normally using obsolete, non-refrigerated lorries. If the exportation is carried out by land, the transportation is carried out directly from the centre to the target market in large refrigerated lorries belonging to foreign transport companies (mainly French and Spanish).

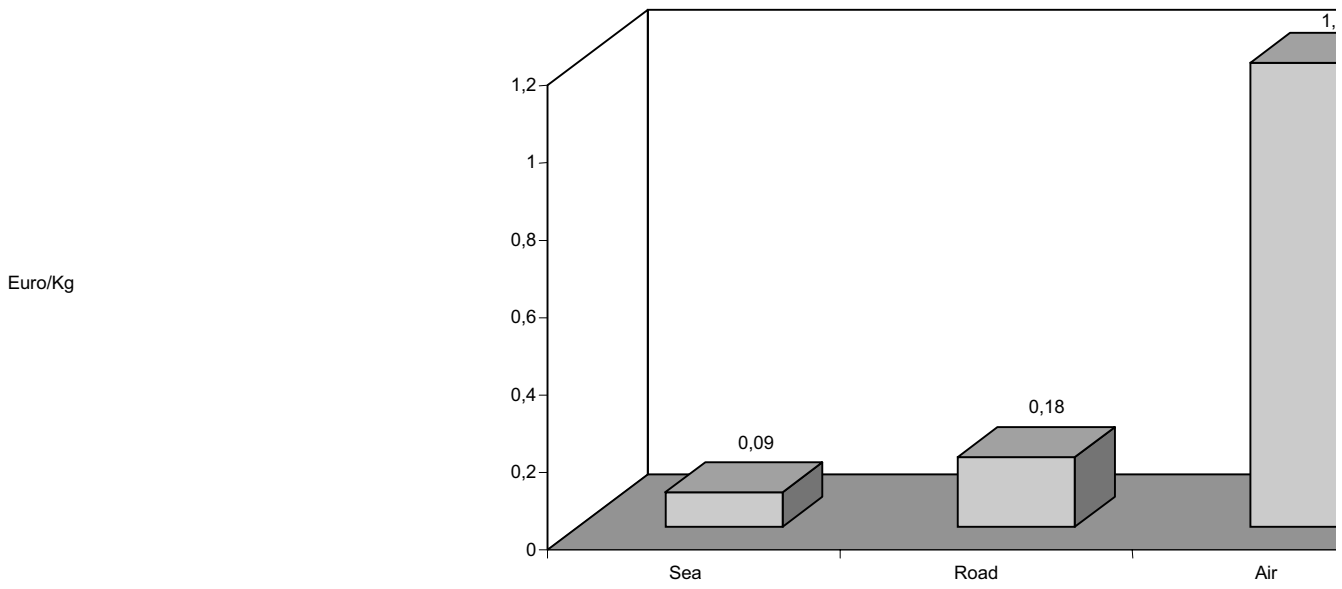
The availability of a good international transport system is fundamental to the competitiveness of the fruit and vegetable sector in an increasingly competitive environment[12]. Good transport logistics (without delays or breakdowns) allow fast produce transportation with the lowest possible deterioration and under optimal conditions. The logistics have become an essential element in the commercial strategy of the exporter, since they have a direct impact on delivery times and the quality of the product. In the case of Morocco, the great distance to the target market made the lack of competitive international transport and created a huge bottleneck in the growth of fruit and vegetable exports for many years. This situation lasted, until the beginning of the 1990s when land transport developed as a result of the ratification of the TIR agreement between Morocco and Spain which allowed goods to be transported across Spanish territory without having to keep loading and unloading the goods.

Although sea transport was the first means used for Moroccan fruit and vegetables export to foreign markets until the beginning of the 1990s, its current significance is marginal (two per cent of fruit and vegetable exports). Its use continues to be predominant for the export of citrus fruit, but in the case of other fruit and vegetables it is used only for export to the Russian markets.

As highlighted by the Moroccan Association of Producers and Exporters of Early Fruit and Vegetables (ASPEM, 1997), sea transport – with its drawbacks associated with the long periods involved, substantial, irregular and heterogeneous supply – has not been able to respond to the demands of large European distribution worried about a regular and prompt supply of a consistently high-quality product, in large quantities and at relatively stable prices. Although it continues to maintain the advantage of low costs with regard to air and road transport (graph 2), it has become marginal for the export of fruit and vegetables.

[12] For an analysis of the significance of the logistics and transport for competitiveness in the fruit and vegetable sector in general and the Spanish market in particular, see Álvarez Ramos (2002, 2003).

GRAPH Nº 2. TRANSPORTATION COST OF TOMATOES FROM MOROCCO TO FRANCE IN 2003 (Euro/kg)



Source: EACCE

The shipment by air of fruit and vegetables has the advantage of being able to reach far-away markets in a very short time, which makes it possible to preserve the quality of the produce. On the other hand, however, it is much more expensive than sea or air land transport, so it becomes cost-effective only for certain types of very perishable produce which has high prices in the target market, either because it is a micro-market or a market with a very restricted seasonal supply[13]. Therefore, air transport is becoming limited mainly to produce with very special characteristics, among which fruit and vegetables are not found at least at currents technological levels of air transport. The exportation of fruit and vegetables by air went through a certain development during the period of the OCE monopoly for some produce (green beans and tomatoes) because of the low cost of fuel. But the situation became more complicated during the mid-1980s with the expansion in exports of other products (cut flowers, fresh mint and fresh fish) which came into competition with fruit and vegetables, especially as the capacity of regular airlines became saturated. In order to overcome this drawback, a specialised freight transport company was set up (Royal Air

[13] As Hita López and Calatrava Requena (1998) point out, this last case is becoming less and less frequent because of a marked tendency towards internationalisation in the perishable produce market as well as an increase in the commercial flow between the hemispheres and the consequent reduction of seasonality in the supply.

Cargo), which had two full-time aeroplanes that were used for the export of green beans to Paris and London; melons to London; and tomatoes to Canada (Agribusiness Marketing Investment, 1993; Chiliah, 1993).

In spite of the company creation and the existence of subsidies to certain destinations (Canada and the United States), air transport occupied a marginal role in the transport of fruit and vegetables, to such a degree that it transported only one per cent of Moroccan fruit and vegetable exports. As well as its high cost (graph 2), other deficiencies that limited its development were the poor infrastructure for sending and reception at the airports; the shortage of aeroplanes adapted for the transport of fruit and vegetables; and the absence of return freight.

Nearly all Moroccan exporters choose refrigerated lorries to send their fruit and vegetables to Europe. In spite of its being more expensive than boat (graph 2), it has considerable advantages in terms of time, safety, preservation of the produce, flexibility and versatility[14]. Road transport is the best means suited to the export of fruit and vegetables in response to the new demand requirements in terms of regularity, continuity and quality, as well as allowing a greater market control. All these advantages have brought about its increasing use, making it now the dominant means of transport carrying around 97 per cent of the exported fruit and vegetables[15].

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[14] The transportation of fresh fruit and vegetables to the European market in refrigerated lorries considerably reduces the drawbacks of transport by sea. The advantages are as follows: quality control takes place at the processing centre; handling is reduced to a minimum; the lack of damage to the goods; the transport of the goods takes place under good conditions; the depreciation threshold is reduced (an average of 18 tonnes); the transport time is cut by half, as the European market can be reached in three to four days; the great flexibility of use, as the exporter has the option of choosing the delivery time, the itinerary and making the transport from door to door possible – from the place of production to the point of sale, the final destination can also be changed according to market conditions; it facilitates the management of the consignment both in quality and quantity producing favourable commercial effects, given that it has been transformed from is system of discontinuous flow with numerous loadings and unloadings (by boat) to a continuous flow of smaller consignments (by lorry); and allowing a faster response to the demands of the clientele both in calibre and tonnage..

[15] A fundamental event in the positive evolution of the transport of fruit and vegetables by road was the 1988 signing of an agreement between the Kingdom of Spain and the Kingdom of Morocco dealing with international road freight transport (BOE nº 92 of the 16th of April 1988), which enabled Moroccan goods to pass through Spain. The simplification of the transit procedures that followed the ratification of the TIR agreement, together with the creation of the Single Market, facilitated the transport of Moroccan fruit and vegetables across European territory.

But road transport in Morocco does have a number of disadvantages that have negative repercussions on the export costs:

An insufficient and deficient road infrastructure. Out of the more than one thousand kilometres that separate the main tomato exporter (Agadir) to the port of Tangier, only about four hundred kilometres are motorway. On the stretch from Agadir to Marrakech there are often sections without a tarmac surface. This lack of surface varies considerable throughout the journey duration negatively affecting the quality of fruit and vegetables being exported.

The high rates of taxes that the lorries must pay for their transit through Moroccan territory and to cross the Strait of Gibraltar. The tax to be paid to the National Transport Organisation (ONT) amounts from €165 to €185, according to the distance covered. On top, are the fees paid to the shipping company (Tangier-Algeciras) as well as the Customs Office in Morocco and Algeciras which can be as much as 1,200 Euros.

The existence of a reduced national TIR fleet makes it necessary to rely on foreign transport companies (mainly Spanish and French). This external dependency increases the cost because the majority of the refrigerated lorries enter Morocco empty and, as a result, the transport operator is unable to offer a reduction that it would be able to offer if it came back to Agadir with a load. Another problem deriving from this dependency was that there were frequently not enough refrigerated lorries, especially in the decisive moments of the export season. This situation has changed in the past few years as a result of the considerable increase in the Spanish fleet of refrigerated lorries available to travel along this route, which brought about a significant improvement in the quality of the service rendered and a reduction in prices charged.

EXPORTATION GROUPS

Few processing centres can assemble enough tonnage to be able to export well by themselves, so they are compelled to set up an exportation group with others in order to achieve minimum quantities of supply and obtain economies of scale. The exportation groups are entities set up around one or several processing centres. As well as defending the interests of its members, the role of these groups is to regroup the shipments within the framework of the same commercial strategy. The groups assure the rendering of services, especially those concerning logistics and transit to the benefit of the affiliated centres. In return, the groups retain a commission calculated by the sale price which varies between five and 10 per cent according to the group in question. The

centres can change exportation group from one season to another according to their agreement, although the smaller groups are usually turned down by the larger exportation groups and have to resort to their only alternative, the OCE.

After opening up fruit and vegetable exports in 1986, several exportation groups were set up. Currently there are 15 groups devoted to the export of fruit and vegetables. The average volume exported by each group is small, which demonstrates their limited standing for participation in foreign markets, even though there is a large degree of heterogeneity in the competition. As a consequence, those entities first appearing were those that have a large volume and were able to compete in foreign markets, while responding to the demands imposed by the large distribution chains. But at the opposite extreme, there were exportation groups lacking the size required to be competitive, which exported irregularly smaller quantities and on many occasions contributed to distorting the market by creating the sensation that there was an excess of supply or by the insufficient produce quality. The large number of operators fragmented the supply and sharply reduced their negotiating power.

The range of produce exported by the groups is limited, so that five of them export only tomatoes, and only two offer more than three types of produce (table 1). The programming of supply is carried out only by the large suppliers, which shows that a large part of the production is still not in line with the needs of the customers (both in date and produce required), but merely production producing without taking into account the demand.

TABLE Nº 1. EXPORTING GROUPS IN MOROCCO AND PRODUCTS EXPORTED IN THE 2001/02 SEASON

Exporting group	Exported Fruit and Vegetable Products
Agri Souss	Tomato, pimiento, green beans and courgette
Agri Sun	Tomato
Armona	Tomato
Consimtex	Tomato, melon and green beans
Delassus	Tomato and melon
G.E.D.A.	Tomato
G.P.A.	Tomato and green beans
Maraissa	Tomato, pimiento, green beans, courgette, melon and

	aubergine
OCE	Tomato, green beans and melon
Prim Atlas	Tomato and pimiento
Rosaflor	Tomato and melon
Salam	Tomato
Semapex	Tomato and melon
Soema	Tomato
Soprofel	Tomato and melon

Source: EACCE

The number of brands is excessive. Each exportation group has several brands according to the processing centre that provides the type of produce, the produce quality and/or the target market (only the two most important groups work exclusively with one brand). The produce promotion and publicity are very scarce, limiting the majority of the exportation groups to advertising in the specialist press or in collaboration with generic publicity campaigns.

The main way of selling is to hand the goods over to a commissioning agent per shipment and only the largest exportation groups usually sell to big distributors and purchasing centres. There is absolutely no co-ordination between the exportation groups and the foreign markets. So, although the EACCE is in charge of dividing the exportation quota between the different groups with the objective of not exceeding the amounts assigned in the Association Agreement with the EU, once this delivery is carried out, each group can operate independently of the target market.

Three types of exportation groups can be distinguished according to the commercial policy as follows:

Integrated groups: groups that have their own farms and that process their produce in centres, usually quite large and located on their own property. Their facilities use most modern technologies and offer better service, thus allowing them to offer added value. They process and commercialise produce harvested only from their own farms. They have their own logistical infrastructures and ship fruit and vegetables to the foreign markets under their own brand. All of their produce is sent by refrigerated lorry allowing them to send the produce in good conditions and at a reduced period of time. They offer a wide range of fruit and vegetables and usually sell to big distributors and purchasing centres. This type of group includes those backed by foreign (mainly French) investors, of which the most representative ones are Maraissa (Azura brand) and Rosaflor (Idyl brand).

Mixed integrated groups: similar to the above mentioned ones, they are made up of those groups that process their own produce in their own centres, but that also buy fruit and vegetables from other growers. On occasions they also commercialise the produce from independent centres in order to reduce fixed costs. Given that the quality is usually variable, they use different brands according to the processing centre supplying the produce, the produce quality and/or the target market. Although part of the produce is sold to department stores, the majority is sent on through commissioning agents. The means of transport used is usually by road and, on occasions, by sea. Among the groups belonging to this category are Agri Souss, G.P.A, G.E.D.A and Salam.

Intermediary groups: are those who do not have farms and whose function is to sell the produce to the centres themselves or to independent ones. They are in charge of transferring the produce from the smallest and more traditional centres, which use obsolete machinery, antiquated premises and archaic techniques. The selling method is traditional through the handing over of the produce to a commissioning agent by consignment and using several brands. The majority of the shipments were by sea, although the majority now send their produce by road. The former state export company (OCE), and Sogecap can be found in this group.

TARGET MARKETS

Regarding the destination of the exports, the European Union is the main market for early Moroccan fruit and vegetables, accounting for around 90 per cent. Within Europe, the main customer is France, taking up around 85 per cent of Moroccan produce sent to the Union. This dependency on the Union market is one of the main features of the Moroccan fruit and vegetable sector, although in the past few years it has begun to weaken. So, in the case of tomatoes, the percentage of exports directed at the EU has decreased from 97 per cent in the 1970s to 81.6 per cent in the 2001/02 season, although the real quantity has increased (table 2). Within the EU, however, the dependence on the French market has increased dramatically, given that in the 1977/78 season, France accounted for 72.8 per cent of Moroccan tomatoes destined for the Union market, in that of 2001/02 this rose to 96.4 per cent. For its part, the German market, the second in importance for many years, has practically disappeared as a destination. It represented 25.6 per cent of the Union market in the 1977/78 season, but in that of 2001/02 it was only 0.2 per cent. In the 2001/02 season the second importer was Spain with 2.7 per cent of imports. This new role of Spain as an importer of

Moroccan tomatoes reflects the growing acquisition by Spanish companies of tomatoes coming from Morocco in order to send them on later to other foreign markets.

Switzerland is the second largest purchaser of foreign sales from Morocco, accounting for 6.8 per cent of exports, followed by Russia with five per cent. Although these figures show a certain diversification in sales from outside the EU, this strategy is littered with many obstacles – in the case of Russia resulting from its continuing economic and financial crisis. So, exports were only 10,292 Tm in the 2001/02 season as opposed to more than 40,000 Tm reached in the 1997/98 season. Exports to Canada and the United States have also gone down now making them nothing more than a token market. As well as the temporary closure of the North American market, this unusual situation reflects the difficulties encountered by Moroccan operators in breaking into these markets, given that compliance with the strict regulation requires additional investment at all levels (production, logistics and trade), which has still not been overcome. Tackling these adverse conditions, the ten EU new members are taking on a greater significance as a destination for Moroccan fruit and vegetable exports. Between them, the Czech Republic, Slovakia, Poland, Hungary and Slovenia, account for 6.5 per cent of total exports.

TABLE Nº 2. EXPORTATION OF MOROCCAN TOMATOES BY COUNTRY (in Tm)

	1977/78 Season			2001/02 Season		
Country	Tonnes	% s/total	% s/subtotal	Tonnes	% s/total	% s/subtotal
France	74.814	71,0	72,8	161.300	78,7	96,4
Germany	26.334	25,0	25,6	378	0,2	0,2
United Kingdom	798	0,8	0,8	1	0,0	0,0
The Netherlands	200	0,2	0,2	147	0,1	0,1
Spain	0	0,0	0,0	4.559	2,2	2,7
Other countries	566	0,5	0,6	899	0,4	0,5
Total EU	102.712	97,5	100,0	167.284	81,6	100,0
Switzerland	0	0,0	0,0	13.863	6,8	36,8
Russia	0	0,0	0,0	10.292	5,0	27,3
Czech Republic	0	0,0	0,0	5.672	2,8	15,1
Slovakia	0	0,0	0,0	3.967	1,9	10,5
Poland	0	0,0	0,0	2.534	1,2	6,7
Hungary	0	0,0	0,0	773	0,4	2,1
Slovenia	0	0,0	0,0	388	0,2	1,0
Canada	0	0,0	0,0	103	0,1	0,3
Others	0	0,0	0,0	90	0,0	0,2
Total other	2.631	2,5	100,0	37.682	18,4	100,0

countries		
Total exported	105.343 100,0	204.966 100,0

Source: EACCE (several years). Drawn up by the author.

The persistence and even the increase in the concentration of fruit and vegetable exports in the French market is explained to a large degree by the enormous significance of exportation groups supported by French capital, which have as their main objective (and in some cases the only one) to make good their supply in the French market. Their ultimate aim is to obtain production during those months of the season in which it is not possible to do so in France resulting from the adverse weather conditions. So, it is French investors who guarantee the continuous supply of fruit and vegetables for the whole season in order to complement their national production with that from Morocco, so that they can fill in the "gaps" that had previously been serviced by Spanish and Dutch exporters. Therefore, the prime objective of these investors is to supply the French market and, in principle, they have very little interest in breaking into markets in other countries. Difficulties resulting from protectionism from the Union must also be taken into account (France itself has its own quotas) as well as the lack of dynamism on the part of Moroccan exporters who have got used to supplying the same markets, dealing with the same intermediaries and maintaining their traditional trade systems[16].

FINAL CONSIDERATIONS

The last part is dedicated to looking at a series of considerations on certain aspects of the Moroccan commercial system which may determine the future competitiveness of its fruit and vegetable sector.

Facing other countries in which their home market constitutes a valid alternative opening to foreign markets resulting from its size or required degree of quality. In the case of Morocco, the home fruit and vegetable market does not represent a viable alternative because the considerable malfunctions and holes in its organisation increase transaction costs and penalise both the consumer and the grower.

[16] Akesbi (1995) revealed this tendency of marinating the traditional trade systems, pointing out the need for a greater initiative and dynamism on the part of the commercial agents if they wanted to increase their level of competitiveness.

The distance that Moroccan fruit and vegetables need to travel is quite large (2,500-3,500 Km), which means that, compared to other competitors such as Spain, high transport costs, a reduction in quality and worsening of the capacity of commercial response both in duration (three days) and uncertainty (for the long distances and the need to cross the Straits of Gibraltar)[17].

Although the logistics have improved in the past few years by substituting the transport of fruit and vegetables by sea to road, the limited development of national transport groups places this service in the hands of foreign companies (mainly Spanish and French) with higher costs as the return journey cannot be exploited.

There is a large number of exporting groups supplying a reduced average volume. Most of them offer a unique produce (tomatoes), which makes them extremely vulnerable. If problems arise during trade, the repercussions could be damaging. This dependency on just one product is also a very significant weakness when compared to competing exporters' groups (mainly from Spain and the Netherlands) that are able to supply large amounts of a wide range of fruit and vegetables, increasing the possibilities of loyalty to the customer.

This fragmentation in the trade system, which is a deficiency, is becoming more and more significant in the international context of progressive concentration on target markets. The changes in target markets has had considerable effects on the original markets, so that the commercial operators become subject to the increasing demands in terms of price, quality, range, seasonal variation or services incorporated in the produce[18]. So, the lower volumes exported, the limited range of fruit and vegetable products offered and the shortage of quality certification, compel the majority of Moroccan exporters' groups to use the traditional channels of distribution concentrated around the wholesale markets. Only those exportation groups supported by foreign capital have the production, technical, organisational, logistical and commercial provisions to be able to respond to the demand of the large distribution chains.

Finally, the fact that more dynamic and better organised exportation groups are supported by French capital proves to be a great hindrance at the time of planning a

[17] The works of Guardo (1998) and Calatrava Requena and Mahfoud (2001) can be consulted for a comparative analysis of the commercialisation of both the Spanish and Moroccan tomato in the French market.

[18] There are numerous works dealing with the development of modern distribution and its effects on horticultural products trade: Ramos Real (1991), Siguan Boehmer (1995), Arcas Lario and Ruiz de Maya (1997), Cook (1997), Langreo and De Manuel (1998), Mollá Descals and Sánchez Pérez (2000) and Planells and Mir (2002).

possible sales increase in other countries. This is because these exportation groups are the only ones that can provide leadership in the process of diversification of the target markets as a result of the availability of the investment, technological and commercial capacity required to deal with a company of such magnitude.

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ESTIMATION OF THE TARIFF EQUIVALENT TO THE QUOTA SYSTEM APPLIED TO THE IMPORT OF MOROCCAN TOMATOES

Dr. Ramón Mahía and Dr. Rafael de Arce[19]

I. - Description of the E.U. quota system for Moroccan tomatoes

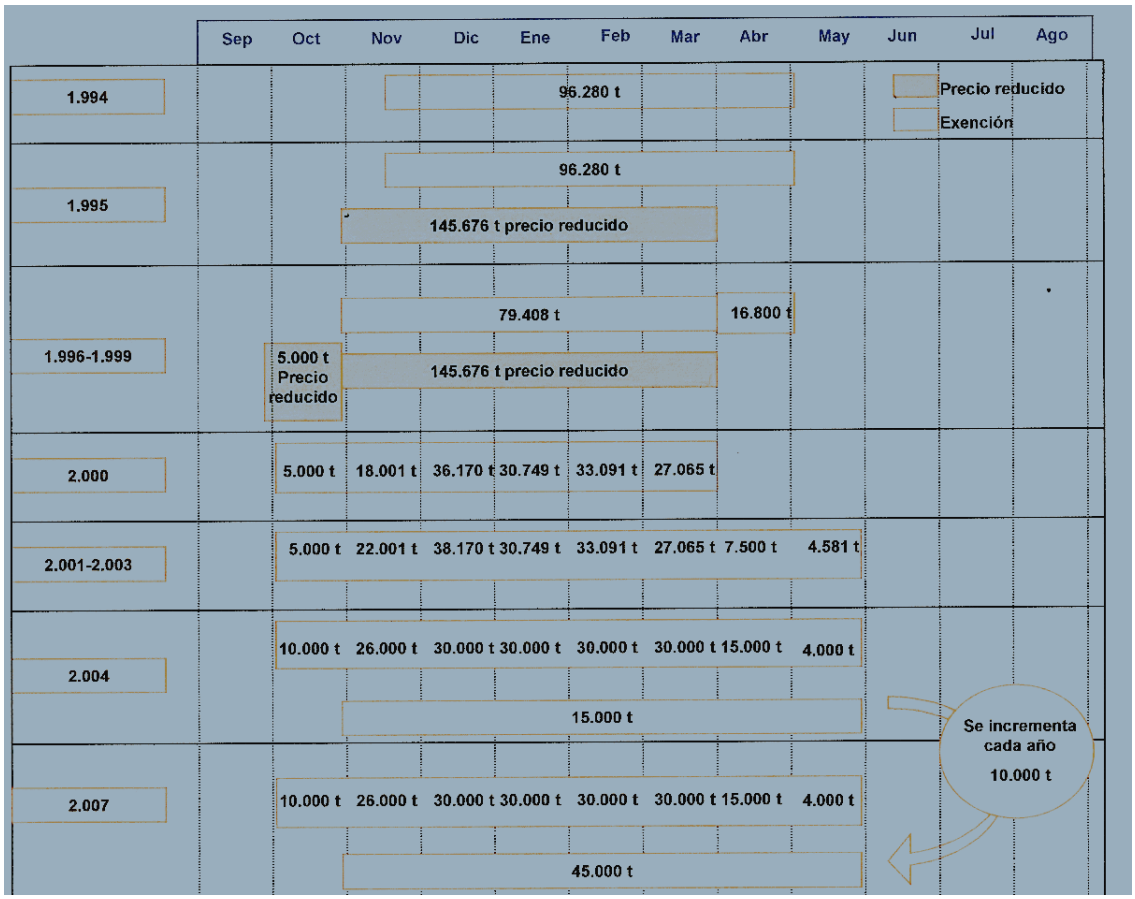
The system of tariff protection for the import of tomatoes from Morocco in the E.U. is contained within the framework of a preferential agreement. This type of agreement, relatively common in the tariff policy of any country or region, means the application of a series of measures to relax the protection system of the European market against imports from certain countries. In general terms, these measures may consist of a total or partial exemption of tariff duties to be applied either to a certain volume of imports (quotas) or as an unlimited measure. These total or partial exemptions are applicable for the whole period covered by the agreement which, on occasions, is usually reduced, as in our case, to certain established times of the year according to the interests of the home market. Outside of the periods covered, the same tariff duties are applied as to other countries or products.

The general regulations are about establishing an entry limitation in those months in which Moroccan tomatoes are in direct competition with the interests of Community producers (from June to September) as the preferential agreement permits the North African produce a limited entry with no tariff during the rest of the year, especially in the period from October to May.

The current state of the quota system regulations for Moroccan tomatoes is the result of a process which dates back, at least, to 1994, the year in which a quota of 96,280 tonnes, exempt from customs duty, had already been agreed. From 1999 to the present day, successive bilateral negotiations have reduced the entry quotas to reduced prices, concentrating the preferential agreement on the establishment of a single exempt quota and, at the same time, have increased both the quantity of the annual quotas and the period of the year in which it is in force.

[19] Professors from the Department of Applied Economics of the UAM (Econometrics) and researchers from AGREEM. Research financed by FEMISE and lead by Professor Dr. Alejandro Lorca.

Moroccan Tomato
Import Regime Changes since 1994



Source: Repercusión de los acuerdos preferenciales con Marruecos para el cultivo de tomate en Andalucía. Dec. 2003. Unidad de Prospectiva de la Consejería de Agricultura y Pesca. Junta de Andalucía

The current regulations relating to the Community tariff quotas of the 9th of January 2004[20] state, in its second appendix, the amounts subject to quotas and the periods in which they are in force

Quotas for Moroccan tomatoes:
Net weight in tonnes and the periods in which they are applied

	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Abr.	May.	Jun.	Jul.	Aug.
Base Quota		10000	26000	30000	30000	30000	30000	15000	4000			
Additional Quota			15000									

As can be seen, the agreement states a monthly quota, free from tariffs, of 175,000 tonnes per season (from October to May). This seasonal distribution of the quota allows for a certain degree of flexibility that, if the quota is not attained completely for one particular month, it can

[20] Regulation (CE) Nº 37/2004 OF THE COMMISSION of the 9th of January 2004

be transferred to another time of the year. At the same time, there is the possibility of slightly exceeding the monthly quota "on account" from the remaining amounts. Additional to this basic quota, the use of an additional quota of 15,000 tonnes is permitted which:

1. - may be used between November and May on condition that not more than 30% of it is used in a single month and,

2. - is increased annually by 10.000 tonnes to a total of 45.000 in the 2006-2007 season.

What is meant as imports of more than the quotas taken onto account in the preferential agreement (over quota rate), the applicable duties vary according to (1) the date of import and (2) the entry price of the imports. In general terms, an *ad-valorem* duty of between 3.5% and 5.7% is established for each date to which *ad-quantum* duties are added according to the entry price; the total tariff calculated in *ad-valorem* terms varies between 3.5% and 14.29% respectively for those import entry prices that are greater or lower. Additionally, and for all periods of the year, a minimum price is established below which an ad-*quantum* quota is established of almost €30 for each 100 Kg which may be considered as a peak prohibitive quota. The details of the structure can be seen in Appendix I of this document.

It must be clarified that, within the quota system, the exempted tariffs are conditioned by the entry price of the tomatoes at source which, *de facto*, limits the scope of the exemption to a minimum limit which does not imply a threat to the national production. So, the exemptions come about as a reduction to zero of the specific duties envisaged in the list of concessions of the WTO (World Trade Organisation) provided that the entry price is not less than 461 Euros per tonne. As set out in the regulation itself, if the entry price for a batch is 2%, 4%, 6%, or 8% lower than the entry price, the specific quota system duties will be the same, respectively, 2%, 4%, 6% or 8% of this agreed entry price, that is:

Tariffs applicable if the entry price is less than €461/Tn

% Price below €461/Tn	Entry Price	Tariff €/Tn
2%	451.8	9.22
4%	442.6	18.44
6%	433.3	27.66
8%	424.1	36.88
> 8%	-	WTO Tariff

On the other hand, the agreement establishes a sanction mechanism through which, when the total volume of Moroccan tomato exports during a given period exceeds that agreed to in the

sum of both kinds of quota, the additional quota of the following period will be reduced to an established level which, from October 2005, is fixed at 25,000 tonnes (without prejudice to the annual increase agreed to for the aforementioned additional quotas, that is, 10,000 new tonnes per year).

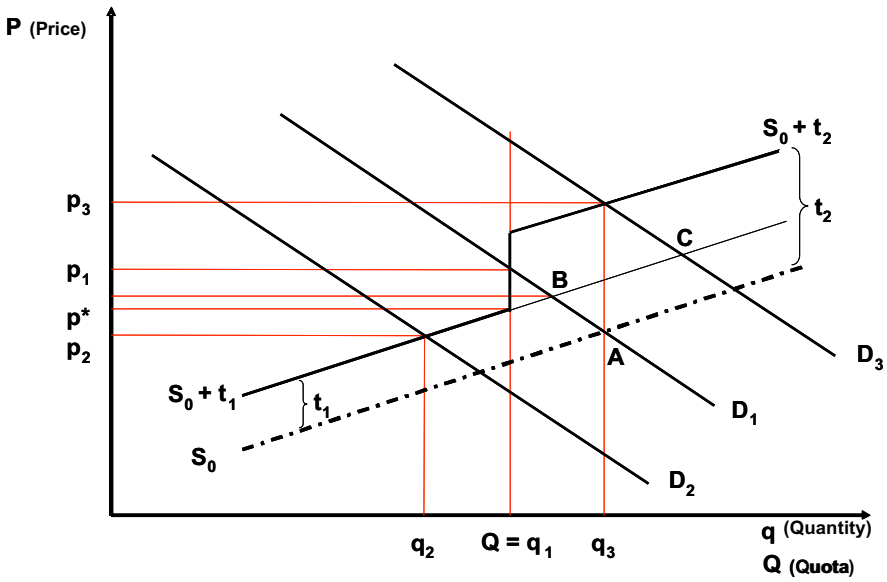
II. - Alternative methodology for the application of tariffs to a quota system

The simulation model for the impacts related to the commercial liberalisation set out in this document requires the determination of an *ad-valorem* tariff equivalent to the existing quota system structure for the trade in tomatoes with Morocco. The establishment of this equivalent tariff allows a direct measurement of the reduction in Moroccan tomato prices to be obtained derived from the breaking down of commercial barriers.

There are basically two alternatives to calculating a tariff equivalent to a quota system: (i) one is to estimate a tomato supply and import demand model; and (ii) deriving the tariff equivalent from the price differences observed between the EC market and the Moroccan import price.

Obtaining the tariff equivalent from the estimation of a supply and import demand model: In this conceptual and theoretical outline the calculation of the equivalent tariff consists of estimating the import demand curve (D_1), the supply curve (S_0) and the tariff impact within the quota (t_1) and outside the quota (t_2) that, along with the quota (q_1), produce the tariff quota's supply curve. Once these curves have been estimated econometrically, obtaining the tariff equivalent means an exercise to calculate which only tariff 't' must be added to S_0 to keep the current price 'p_1'.

TRQ regime under different demand conditions



Obtaining the tariff equivalent from the price gap observable between markets: It means reaching the equivalent tariff through the calculation of the price differences in the reference market (in this case the EU) between the external prices (CIF import prices) and internal prices (representative wholesale prices).

Additionally some opinions allude to a third method that has not been emphasized in this document because it is considered analytically impossible: the calculation of the quota-rent through a direct inquiry to the operators on the price paid for the import certificates. The WTO law is inclined towards the second method, regulating the determination of the price gap between external prices (CIF prices for the importer) and internal prices (representative wholesale prices). If these were not available we could use the FOB prices in one case and to equivalent prices in third countries

III. - Price Gap Methodology

The theoretical basis of the procedure is very simple: If we have the price of a specific product at the border, before going through customs of a certain Country, and after that we obtain the representative price, of the same product, in the immediate stage of its commercialisation which would be at the wholesale stage – covering the stage known as the importation, the gap between both prices will give us the gross margin of the import operation which will evidently include, the transport and/or storage costs and the importer's profits, as well as those of custom clearance, that mainly represent the pay of the Customs Tariff and other possible border costs

that constitute the protection level that exists in the market of the importing country and for this specific product.

In order to simplify it we could set different levels of importer expenses and profits, according to the kind of product we are dealing with and also according to how each function fits into the commercialisation of each product, since sometimes the import stage is not isolated but linked to other stages of the commercialisation process like the distribution – wholesale - , that in turn may or may not include other stages even from the production process.

Consequently and as a final result of the analysis of this price gap, comes up the protection level at the border for the market situation derived from the current regime and that logically should be equivalent to the protection level. Naturally to consider one operation is not enough, nor one country of origin (when we are dealing with a set of exporters), nor a relatively short period of time (for example, one year).

Finally, we must point out that even when the title of the Attachment to Appendix 5 of the Agreement on Agriculture defines the process as "Guidelines for the Calculation…" the Annex 5 itself in paragraph 10 establishes that it is obligatory to use these guidelines in the process of applying tariffs to a product.

IV. - Application of the Price – Gap Method to the calculation of the equivalent tariff for Moroccan Tomatoes

The WTO regulation for the correct application of the Price Gap method requires the selection of a time series sample sufficiently wide to see clearly the evolution of flows and import prices. In our case, and given the constant changes in terms of quotas for Moroccan tomatoes, we have decided to consider the period from January 2001 to February 2005. The main differences between the quotas in 2000 and those currently in force are reduced to the size of the basic quota (which in 2001 was set at 168,157 tonnes and currently at 175,000) and to the existence, at the moment, of an additional quota of 15,000 tonnes in 2004 and 25,000 in 2005).

Likewise, the WTO regulation for the correct application of the Price Gap method requires the suitable selection of exporters subject to the quota system with the aim of establishing a price representative of the real flow of imports into the E.U. However, given that our case is restricted exclusively to tomatoes coming from Morocco, it is not necessary to pose this question.

Once the reference period is established, the following step is to calculate the entry price of Moroccan tomatoes in the European Union and its comparison with the reference wholesale price. Regarding the first point, for the calculation of the entry price of Moroccan tomatoes, we have decided to consider the Unit Value Index of Moroccan tomato imports in terms of CIF in the reference period 2000-2005.

For the calculation of this price we looked at the possibility of considering the imports in terms of value and in volume imported by the 15 countries of the Union and, from these data, obtain the average weighted price. However, given that the average for this period, 86,5% of imports were to France, the Unit Value Index for this country was finally chosen as representative of the total. [21]

The Average Annual Unit Value Index for Moroccan tomato exports to France
Exports of Moroccan tomatoes to France
(€ per 100 Kg)

Period	UVI
2001	71.4
2002	90.9
2003	72.9
2004	78.3
Jan-Feb 2005	86.5

For the establishment of an internal reference price, and given that the vast majority of imports go to France, the wholesale reference price of the Paris - Rungis market has been taken for this type of product[22]:

Wholesale Tomato Price
Paris – Rungis Market (€ per 100 Kg)

Period	UVI
2001	106.0
2002	138.3
2003	128.0
2004	103.2
Jan-Feb 2005	150.2

The difference between both prices expressed in Euros per 100 Kg, and weighted monthly according to the volume of imports registered for each month, allows the tariff equivalent to the quota system structure for Moroccan tomatoes to be approximated. The calculation of this

[21] The calculations of the UVI from value and volume data have been made from official EUROSTAT COMEXT data.
[22] Obtained from the French INSEE statistics server: http://www.indices.insee.fr

average tariff does not differ substantially according to the selected calculation period. Finally, the average calculation for all of the sample considered has been taken:

Equivalent Tariff: Average annual and total sample
(Wholesale Price – CIF in € 100 Kg)

Period	Tariff Equivalent (€ 100 Kg)
2001	41.5
2002	60.8
2003	55.2
2004	50.7
Total Sample	**53.1**

With the aim of fine tuning the previous calculation, we can consider that this difference in prices includes the gross margin of the importer which, in turn is made up of: 1) His profits and business costs and 2) The whole of the payments made when passing through customs. These include the payment of customs duties and other duties and charges, if there were any that theoretically and in their entirety constitute the protection level at the border.

The establishment of the profit margin is very complex, both as a result of the lack of suitable data and the difficulty in finding out to what extent the profits are spread out throughout the production, transport and wholesale commercialisation chain. Thus, faced with the difficulty of carrying out an exact calculation, we can work under the reasonable hypothesis that, in the earlier stages of the simulation, it can be altered in order to generate alternative scenarios. As a conservative starting hypothesis, we are going to consider an import margin of 3% on the wholesale price. To consider a greater margin would cause, in certain months of the sample period, differences between the CIF price and the wholesale price to fall to negative figures (losses for the importer), which are not seen as reasonable. From the available data, the calculations come up with the following results:

Equivalent Tariffs without Profits for the Importer:
Average annual and total sample
(Wholesale Price – CIF in € 100 Kg)

Period	Tariff Equivalent (€ 100 Kg)	Tariff Equivalent (Without Importer Profit)
2001	41.5	38.3
2002	60.8	56.0
2003	55.2	51.6
2004	50.7	47.1
Total Sample	**53.1**	**49.3**

The following improvement consists of separating the costs associated to the import operation from the calculation. To that effect, the most relevant are the transport costs from the origin to the destination. Again, there are no specific data relative to the cost of transporting the tomatoes from Morocco to France, but the available data for 2004 regarding the transport costs from different origins to other destinations at similar distances to those being studied reveal a general view of very stable transport costs: based on the available data at cost of around 5.5% on the wholesale price can be seen[23]. Nevertheless, when considering a single wholesale market (Paris) to which other operators from the Community have also to come from outside origins, it must be supposed that this 5.5% of transport costs is not in its totality attributable to the import operation. Our hypothesis, which we deem reasonable, is that the cost imputable to the transport form Morocco to the Community border will not exceed 25% of the total transport cost, so that we reduce the attributable cost of the import operation to1.5% of the wholesale price. Considering these costs, the calculations are duly modified and are set out in the following table:

Equivalent Tariffs without Profits for the Importer nor Transport Costs: Average annual and total sample (Wholesale Price – CIF in € 100 Kg)

Period	Tariff Equivalent (€ 100 Kg)	Tariff Equivalent (Without Importer Profit)	Tariff Equivalent (Without Importer Profit and Transport Costs)
2001	41.5	38.3	36.7
2002	60.8	56.0	53.6
2003	55.2	51.6	49.8
2004	50.7	47.1	45.2
Total Sample	**53.1**	**49.3**	**47.3**

These tariffs measured in Euros per 100 Kg, can be converted into *ad-valorem* terms by dividing them between the CIF price to obtain the following results:

Equivalent Tariff: Final Result: Average annual and total sample (in % on the CIF Price)

Period	Tariff Equivalent (% CIF Price)
2001	57.6%
2002	55.3%
2003	76.7%
2004	65.1%
Total Sample	**63.9%**

[23] Tomatoland Report: Transport costs & duties to main destinations. www.tomatoland.com

Nevertheless, all of the previous calculations can be qualified through different additional considerations which lead us to consider the result as a mere quantitative approximation. Between the most obvious criticisms, we can single out that the wholesale price considered in the French market, makes reference to an average calculation for the same varieties of tomato independently of the origins of the product. It is reasonable to think, therefore, that the Moroccan tomato is valued by the European consumer for its origin in a different way than the French or Spanish tomato, even though there are no objective differences in quality and appearance. This fact can also result in different wholesale market prices.

With the aim of improving the calculation and taking into account the previous comment, we have carried out a detailed exploration into the functioning of the French wholesale market and obtained, for the year 2004, a weekly comparison between the wholesale prices of both Moroccan and 'Community' tomatoes (French and Spanish). It can therefore be supposed that the differences in price between both types are around 25%[24]; from this correction, the equivalent tariffs obtained are corrected downwards substantially and resulting in the figured detailed in the following table:

Final Equivalent Tariff
(Corrected differences in the wholesale market between the European and Moroccan tomato):
Average annual and total sample
(in % on the CIF Price)

Period	Tariff Equivalent (% CIF Price)
2001	14.2%
2002	13.1%
2003	22.1%
2004	17.4%
Total Sample	**16.9%**

In order to obtain the results set out up until now, we have considered the flows and import prices of Moroccan tomatoes for all periods of the year. However, looking at the tariff structure applicable to the over-quota import, it can be concluded that that true restriction to the free import of Moroccan tomatoes lies in the first part of the year (January to March). Really, only between January and March, is the entry price of Moroccan tomatoes clearly found to be below the price limit marked by the over-quota structure for the imposition of a higher tariff:

[24] The tomato in 2004. Bilan de campagne national. Direction des Politiques Economique et Internationale. Service des Nouvelles des Marchés. SNM Bordeaux. March 2005.

CIF Price 2003 – 2004 of Moroccan Tomatoes in France and their comparison with the minimum limit set out by the Over - Quota Tariff Structure

Period	Average CIF Moroccan Tomato Price		Threshold Price (1)
	2003	2004	
January – March	61.9	59.4	79.5
April	94.3	55.3	103.6
1st May – 14th May	98.3	85.7	66.8
15th May – 31st May	98.3	85.7	66.8
1st June – 30th September	77.2	77.2	48.4
1st October – 31st October	62.8	62.8	57.6
1st November – 30th November	57.8	83.2	57.6
1st December – 20th December	61.7	92.3	57.6
21st December – 31st December	61.7	92.3	62.2

(1) Below this minimum limit, the imports are taxed with an *ad-valorem* tariff of between 3.5% and 5.7% as well as a prohibitive *ad-quantum* tariff of 29.8 € for each 100 Kg.

If we take into account this peculiarity, we would be able to repeat the calculation of the tariff equivalent to the quota by focusing only on the first term. The results obtained differ slightly, over the years, to those seen for the calculation referring to the yearly total and as can be seen in the following table although the result for the total of the 2001-2004 sample is very similar to that contained previously:

Final Equivalent Tariff (1st Trimester)
Average annual and total sample
(in % on the CIF Price)

Period	Tariff Equivalent (% CIF Price)
2001	15.3%
2002	10.8%
2003	19.5%
2004	20.1%
Total Sample	**16.3%**

Finally, and with the aim of qualifying the results obtained for the total of the sample considered, we must point out that the data obtained for 2002 may be considered as clearly atypical for this year. In 2002 the price of tomatoes reached its highest historical figure, as a result of the climate. The wholesale price for 100 Kg reached its peak with prices of more than €257 on the month of March, and the price of Moroccan tomatoes even exceeded €200 per 100 Kg, more than double the price of the corresponding month of both the previous and following years. These high prices cause the price – gap procedure to produce an atypically reduced tariff when expressed as a percentage of the CIF price making it unadvisable to consider the result

from this year when calculating the overall average. Thus, our working hypothesis consists of using the 2000-2001-2003-2004 average, therefore excluding the year 2002; the average weighted figure was 18.1%.

ANNEX I : In Quota and Out of the Quota Tariff Structure for Moroccan Tomato

Ordinary Contingent	Add. Contingent	Ordinary Duty Rate (also Over - Quota Rate)				
		Prices (100 Kg)	AD-Valorem	€ 100 Kg Add. Tariff		
				€	Ad Valorem Equivalent	Ad Valorem TOTAL
1 January - 31 March						
		> 84,6	3,50%			
		82,9-84,6	3,50%	1,7	2,0%	5,53%
	YES	81,2-82,9	3,50%	3,4	4,1%	7,64%
30.000 Tn for each one of the three months		79,5-81,2	3,50%	5,1	6,3%	9,85%
		77,8-79,5	3,50%	6,8	8,6%	12,15%
1 A		<79,5	3,50%	29,8		
		>112,6	3,50%			
	YES	110,3-112,6	3,50%	2,3	2,1%	5,56%
15.000 Tn for the 30 days		108,1-110,3	3,50%	4,5	4,1%	7,62%
		105,8-108,1	3,50%	6,8	6,4%	9,86%
		103,6-105,8	3,50%	9,0	8,6%	12,10%
1 May - 14 May		<103,6	3,50%	29,8		
		>72,6	3,50%			
	YES	71,1-72,6	3,50%	1,5	2,1%	5,59%
4.000 Tn for this 14 days		69,7-71,1	3,50%	2,9	4,1%	7,62%
		68,2-69,7	3,50%	4,4	6,4%	9,88%
		66,8-68,2	3,50%	5,8	8,6%	12,09%
15 May - 31 May		<66,8	3,50%	29,8		
		>72,6	5,70%			
	YES	71,1-72,6	5,70%	1,5	2,1%	7,79%
4.000 Tn for this 17 days		69,7-71,1	5,70%	2,9	4,1%	9,82%
		68,2-69,7	5,70%	4,4	6,4%	12,08%
		66,8-68,2	5,70%	5,8	8,6%	14,29%
1 June - 30 September		<66,8	5,70%	29,8		
		>52,6	5,70%			
NO	NO	51,5-52,6	5,70%	1,1	2,1%	7,81%
		50,5-51,5	5,70%	2,1	4,1%	9,82%
		49,4-50,5	5,70%	3,2	6,4%	12,11%
		48,4-49,4	5,70%	4,2	8,6%	14,29%
		<48,4	5,70%	29,8		

1 Octubre - 31 Octubre

10.000 Tn for this 31 days		>62,6	5,70%			
	NO	61,3-62,6	5,70%	1,3	2,1%	7,80%
		60,1-61,3	5,70%	2,5	4,1%	9,82%
		58,8-60,1	5,70%	3,8	6,4%	12,09%
		57,6-58,8	5,70%	5,0	8,6%	14,29%
		<57,6	5,70%	29,8		

1 November - 30 November

26.000 Tn for this 30 days		>62,6	5,70%			
	YES	61,3-62,6	5,70%	1,3	2,1%	7,80%
		60,1-61,3	5,70%	2,5	4,1%	9,82%
		58,8-60,1	5,70%	3,8	6,4%	12,09%
		57,6-58,8	5,70%	5,0	8,6%	14,29%
		<57,6	5,70%	29,8		

1 December - 20 December

30.000 Tn for this 20 days		>62,6	5,70%			
	YES	61,3-62,6	5,70%	1,3	2,1%	7,80%
		60,1-61,3	5,70%	2,5	4,1%	9,82%
		58,8-60,1	5,70%	3,8	6,4%	12,09%
		57,6-58,8	5,70%	5,0	8,6%	14,29%
		<57,6	5,70%	29,8		

21 December - 31 December

30.000 Tn for this 11 days		>67,6	3,50%			
	YES	66,2-67,6	3,50%	1,4	2,1%	5,59%
		64,9-66,2	3,50%	2,7	4,1%	7,62%
		63,5-64,9	3,50%	4,1	6,4%	9,89%
		62,2-63,5	3,50%	5,4	8,6%	12,09%
		<62,2	3,50%	29,8		

AN EQUILIBRIUM MODEL TO DETERMINE THE NATIONAL EFFECTS OF AGRICULTURAL LIBERALISATION IN THE MEDITERRANEAN BASIN[25]. MODEL AGRI - MED

Rafael de Arce, Ramón Mahía-Casado and Gonzalo Escribano Francés

This article sets out a quantitative strategy for the simulation of the economic consequences on Mediterranean Partner Countries (MPC's) of agricultural trade liberalisation, within the framework of relations with the European Union, analysing the effects derived from the increase in MPC's agricultural imports from the European Union. This paper focuses on the changes that liberalization would have upon the prices of the international agricultural products involved, upon economic growth and the labour market, from a global as well as a sectoral perspective. This analysis has been conducted with the integrated use of regression analysis, linear optimization procedures and impact analysis with dynamic Input-Output tables.

Key words: Agricultural econometric models, agricultural market, free trade agreements, trade policy UE – MPC's, agricultural products.

JEL classification: Q17,

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I.- INTRODUCTION

Historically, trade relations between the EU and Mediterranean Partner Countries[26] (MPC's) have suffered from a restrictive scheme. In particular, the agricultural sector has been sheltered by agricultural and trade policies, with more sensitive products strongly protected from external competition. From MPC's perspective, the Common Agricultural Policy (CAP) represents a harmful market distortion, as it enables the possibility of real international dumping in some EU's agricultural products sold abroad. These advantages are derived from a system of subsidized production together with trade policy protection from external agricultural products. In MPC's, the protection mechanisms centre on diverse tariff measures, allowing for the prevalence of inefficient inland crops (cereals) of considerable importance to these nations due to the significant population dependent upon them.

In the 1995 Barcelona Conference, the need to provide "peace and security in the Mediterranean" was set out starting, among other initiatives, with a process of sustainable endogenous economic growth, so that wealth could be generated in MPC's. In turn, this would reduce the migration of those living below the poverty line in MPC's to the EU. In this context, it becomes necessary to orientate policies of trade liberalisation between both areas so that the MPC's can benefit from its comparative advantages with regard to EU countries. In spite of the creation of a free trade area for industrial products, an agreement already signed between the EU and almost all the MPC's, the exclusion of agriculture could impede sustainable development in the South, where on average more than 30% of the population is employed in this sector.

This article sets out a quantitative strategy for the simulation of the economic consequences on MPC's derived from an agricultural trade liberalisation in the context of its relations with the EU. It focuses specifically on the effects derived from an eventual increase of imports coming from the EU, although this scheme is easily transferable to the analysis of an increase in MPC's agricultural exports to the EU[27]. The article concentrates on the measurement of the effects that the above mentioned liberalisation would provoke on economic growth and the labour market, both from a global and a sector perspective. The quantitative analysis is carried out by means of

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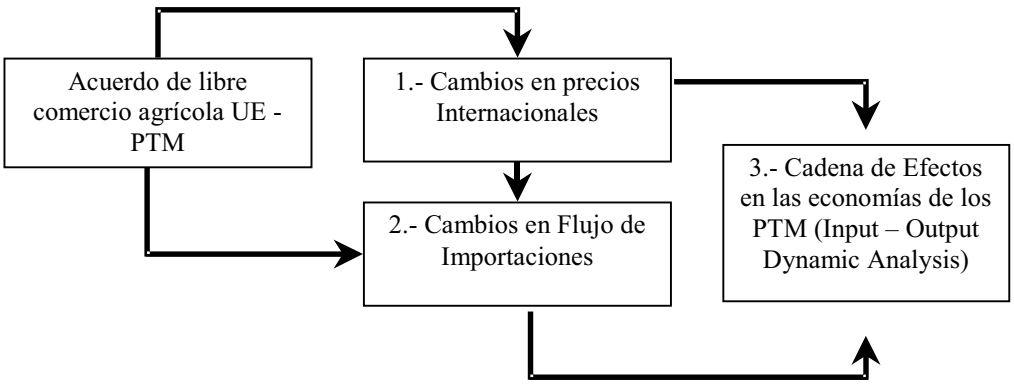
[26] In the EU documents, MPC's are known as the Southern Mediterranean coastal countries: Morocco, Algeria, Tunisia, Egypt, Turkey, Israel, Jordania, Libya, Syria, Cyprus and Lebanon.

[27] See Lorca (2001), in the website: http://www.femise.org/PDF/A_Corrons_09_00.pdf., and Arce and Escribano (2001).

an integrated use of regression analysis, linear optimisation procedures and impact analysis with dynamised Input – Output tables.

The quantitative procedure presented in this document is arranged according to three basic stages. First, the estimation of the net change in international prices for relevant agricultural products, derived from a hypothetical process of trade liberalisation. Second, the estimation of the effect that the above mentioned price changes would cause on MPC's imports from the EU for each category of the selected agricultural products. Finally, the measurement of the effects derived from the adjustment of imports and tariff reduction for MPC's economies. In turn, each of the previous steps implies multiple phases of analysis. The goal of this article is to describe each of them in detail.



EU–MPC's Agricultural free trade agreement /1.Changes in international prices/2.Change in import flows/3.Chain of effects in MPC`s Economies (Dynamic Input-Output Analysis).

The modelling of this type of effects has become common place in the economic literature, and it has increased in importance since the Uruguay Round agreements. Zarazaga (2000) and VanTongeren (2001) present a detailed review of previous models with similar objectives. More usual modelling strategies are Computable General Equilibrium models based on Social Accounting Matrixes (GTAP), models of static equilibrium applied over a determined sample base year, and recursive dynamic models. At every stage of the modelling pursued in this article an important innovation takes place with regard to the traditional static models generally used: the coefficients initially derived from the I-O Tables are dynamised by the modelling of productivity, savings, income dedicated to consumption, etc. All bearing in mind the characteristics of the specific forecast horizon for which the model may be applied.

II.- INTERNATIONAL AGRICULTURAL PRICE CHANGES

Changes in international prices for the main products[28] in this research are calculated as the simple addition of two opposite effects. On the one hand, the possible increase in international prices due to the hypothetical disappearance of domestic agricultural support in the EU. On the other hand, and with opposite sign, the price reduction in bilateral trade is quantified as a direct consequence of a hypothetical tariff reduction by MPC's in agricultural products.

II.a. - Price increase derived from the reduction in EU's agricultural domestic support.

The first effect, which is the rise in prices connected with the abandonment (total or partial) of the European agricultural support system, is quantified by estimating a regression model for each product according to the following equation:

$$Log(P_{it}) = \alpha_0 + \alpha_1 \log(PSE_{it}) + \alpha_2 \log(EUP_{it}) + \alpha_3 HPP_{it} + \varepsilon_{it}$$

Where the logarithm of the international price of the product "i" (P_{it}) remains characterized according to the Product Support Estimate logarithm (PSE_{it}), to the logarithm of the EU export price of that product (EUP_{it}), to the filtered series estimated by a Hodrick-Prescott's function (HPP_{it}) and to a spherical perturbation (ε_{it}), each of them modified by the estimated corresponding elasticity (α_j). In certain cases, some atypical points were found in the common available sample (1986-2001) [29] which was properly corrected with the inclusion of a statistically significant fictitious variable. This equation is congruent with the theoretical framework normally used by authors who defend the balance between supply and demand (Hoeckman, 2002) for the identification of international prices, whose suggestion is:

$$p_w^e = \left[\frac{\sum \frac{a_c}{(1+t_c)(1+\tau_c) s_c^{\lambda^d}}}{\sum \frac{b_c s_c^{\lambda^s}}{(1+\tau_c)^{\varepsilon^d}}} \right]^{\sqrt{(\varepsilon^s + \varepsilon^d)}}$$

[28] They have been selected from Comext (data from EU-MPC flows), and include cereals, basic goods, eggs, sugar, milk, butter, soy oil and dried fruits. These products comprise more than 90% of MPC´s imports from the EU.

[29] The estimation of the smoothed series in Hodrick Prescott's procedure is carried out based upon data available from 1961 to 2001.

where transport costs are also included τ_c, but not taken into consideration here as they are only relevant when a model for individual countries is specified, and not for the whole EU. The parameters a_c and b_c gather in a constant all the components of market size, per capita income, market trend, etc…. In our case, this fundamental variable in the market's development has been modelled in a more suitable way based on the above mentioned Hodrick Prescott's filter (1997). It is evident that we should undertake a previous study of international price volatility with regard to raw materials, an initial and fundamental problem profusely analysed in the literature (Nordstrom, 2001; Chatrath, 2002; and Lence, 2002).

In several occasions, authors linked to the prediction of agricultural prices within the framework of the financial forward agreements market, have decided to use ARCH models to introduce volatility as yet another explanatory component in the price formation. Even when this is probably the most desirable situation in terms of econometric accuracy, it is only possible when the sample is large enough to infer models of the same type with a guarantee of statistical solvency. As the PSE's are estimated on an annual basis, we must resort to a different way to consider this effect in the price series. Specifically, we have decided to consider the cyclic-tendency effect as an explanatory variable of volatility, starting from the determination of the above mentioned component by means of a Hodrick-Prescott's smoothing process.

The third fundamental difference in our study, using this theoretical model, makes reference to the inclusion of implicit modifiers in the formation of EU prices, obtained by taking into account EU export prices for each product. This allows to consider the diverse nature of different application schemes of the intervention prices between the different EU countries[30]. We conclude with Poonyth (2000) that international prices become referencial as the marginal cost in the formation of Community prices, because, in any case, it is the price perceived by the most efficient farmers, the only ones that generate an extra production over the assigned CAP quotas in order to be able to sell outside the Union.

The determination of the domestic support influence, S_c, is explained in a similar way. Tariffs, t_c, are not subject to modification at this stage of the study, where this possibility is not considered in the simulation scenarios as a general rule, but only when tariffs are lifted in MPC's, for which tariffs are calculated in a precise way. This allows duties to be discounted

[30] In several of them, this quota calculation is used to remunerate the farmer; in other cases the average price is applied directly, etc.

directly as a percentage of the final price paid at the destination countries included in the free trade area. The logarithmic transformation provides the linear estimation of this equation with minimal ordinary charts.

With regard to the use of the previously mentioned simulation model, we should ponder the possible existing correlations between the considered variables. It is evident that proposing scenarios which might cause any change in some of the variables, "ceteris paribus", might go against the logic of their close relation. However, from an econometric perspective, the presence of multicollinearity can be discarded from the explanatory series presented, which shows an interrelation of 0.4 points at most, a fact easily presumable due to the scanty range years (1986-2001) which we are to use due to OECD's PSE data availability. In any case, both the significant individual variables presented in the regressions and the high adjustment value obtained, allow us to discard the presence of the usual distortions due to the presence of multicollinearity.

II.b. - Price decrease derived from the tariff reduction in the MPC's.

The tariff data analyzed refers to the MFN tariff (Most Favoured Nation) registered in TRAINS, the UNCTAD official data base. Nevertheless, it is evident that the determination of the real trade protection requires to cover a wide variety of both tariff and non-tariff instruments. Even if we only concentrate on tariffs, it is obvious that the mere observation of the average tariff only contributes to a partial vision of real tariff protection. We should therefore establish some preliminary and necessary remarks that should be considered for the correct interpretation of the results offered here.

In the first place, we should bear in mind the proliferation of non-tariff barriers, in their multiple forms, especially sanitary rules, security and standards, even in the case of products of limited processing and low value added, as those here subjected to analysis. Secondly, the level of tariff protection considered as the starting point in trade negotiations is usually the bound tariff, determined initially within the framework of the "Uruguay Round" Agricultural Agreement, after the conversion of non-bound tariffs into bound tariffs. It is widely known that bound tariffs are, in many cases, substantially above the effectively applied tariffs (Walkenhorst and Dihel, 2002; Abbot and Morse, 1999; Francois, 1999).

Finally, it should be observed that the data used to quantify the effectively applied tariffs are average calculations applied to the ad-valorem tariff for each country and product category. This

average calculation presents important prpblems when it deals with the actual magnitude of tariff protection, since qualitative aspects are not taken into consideration, even when they are essential to value the real level of trade barriers. First, it does not reflect properly the presence of tariff peaks in the tariff structure. Tariff peaks can reach deliberately prohibitive levels (" megatariffs "). As several recent studies illustrate (Fernández Salido, 2002; Hoekman, Ng and Olarreaga, 2002), tariff peaks are still highly present in international agricultural markets, both in developed and developing countries. Besides, the tariff average does not reveal the heterogeneity of the tariff scheme since it is not accompanied by a measurement of dispersion. For the same reasons, the tariff average does not reflect the level of tariff escalation.

The calculations of the average MFN tariff for every product category have been carried out employing the latest annual data available in June 2003 from the TRAINS database (in general, data from 1998, 1999 and 2000, by country and product). For every product category, tariffs applied have been considered in each of the corresponding subcategories in a 6-digit analysis. The tariff calculation for a 4-digit category has been obtained as a weighted average of the tariffs applied in the subcategories, according to the importance of each subcategory in the imports of each country (with data of world imports from year 2000). Given that the tariff can be different for the different subcategories, the mean, maximum and minimum average tariff is provided for every product. From these average tariffs, the weighted average tariff is then calculated by the relative importance of each product in EU bilateral relations with each MPC for every specific product line.

II.c. – Final net change in international prices of agricultural products

Once the two opposite effects on international prices in a liberalisation scenario have been calculated, we can obtain the net final effect as a simple subtraction of both. Nevertheless, it should be pointed out that the use of this simulation scenario implies the assumption of certain starting hypotheses in order to guarantee its accuracy. Specifically, and in a general way, the following points should be assumed:

For the European Union: the elimination of EU domestic support for production does not eliminate the community production, but it implies a reduction in profits for the largest current producers, who obtain an important margin of exploitation (benefiting from an income compensation policy which focuses on small farmers). This profit reduction remains marginally compensated by the current quota absorption of small producers, who withdraw from the market for not being competitive. Besides, we take for granted that trade liberalisation does not have

any effect on the market shares held by the EU in the world market. We therefore assume that market quotas are mainly established according to existing distribution networks, differential transport costs, geographical situation, insurance and freight costs, etc.

For the MPC's: the analysed countries show a deficit in the previously mentioned products, which are considered to be primary goods. Upon this premise we can infer that these countries would be willing to buy as much as possible, up to the limit of their purchasing power. It is also considered that the income dedicated to these products does not rise significantly, and it is therefore assumed that the non-competitive national production is supplanted by external production with lower prices, but of equal monetary value. As a result, part of the internal production is lost.

III. - EFFECTS OF PRICE CHANGES ON TRADE FLOWS AND PUBLIC INCOME IN MPC'S

III.a. - Effects on agricultural MPC's imports from the EU

Changes in the international trade price of the agricultural products considered here will imply an adjustment in trade flows from the EU to MPC's. In order to properly measure this adjustment, an estimation of import demand price elasticity for each product category (j) and country (i) is needed. The simple calculation of price–import elasticity replaces, in this case, the estimation of a full computable partial equilibrium model, with equations of domestic and imported supply and demand for each good. This approach is based on two hypotheses: (1) there hardly exists any internal market capable of replacing import flows; and (2), the consumption of the good is not satisfied and, therefore, import flows will respond to changes in prices in an elastic manner.

Elasticity is estimated with a simple demand function in a linear logarithmic or constant elasticity form[31]:

$$Qij = (1 + Pij)^{-\beta}$$

[8] The economic properties derived from the optimal consumer behaviour theory are implicit and, therefore, it should be established that the demand function satisfies the constraints of budget, homogeneity, Slutsky (negativity and symmetry) and aggregation (Engle and Cournot).

Where *Pj* are the bilateral import prices of good "j" by product "i", and *Q* imports of product "i" by country "j"). Logarithms are used so that the previous expression becomes linear. On the other hand, demand theory suggests the use of real instead of nominal values to represent imports. Moreover, the traditional demand function usually adds a national income variable, also measured in real terms. Then, the resulting basic linear equation is:

$$\ln QR_{ij} = \beta \ln P_{ij} + \gamma \ln PIBR_j + \varepsilon_{ij}$$

Where *QR* are real imports of product "i" from country "j", and GDPR Real Gross Domestic Product of country "j". The use of such a simplified model implies some theoretical bias that should be made explicit. First, production subsidies in MPC's for the considered products causes a reduction in the quantity of demanded imports for each price, increasing the (negative) elasticity of the import demand curve, as shown in the figure below, where P are import prices, Q are import quantities, Dm0 is the import demand curve before production subsidies, and Dm1 is the import demand curve after the implementation of production subsidies.

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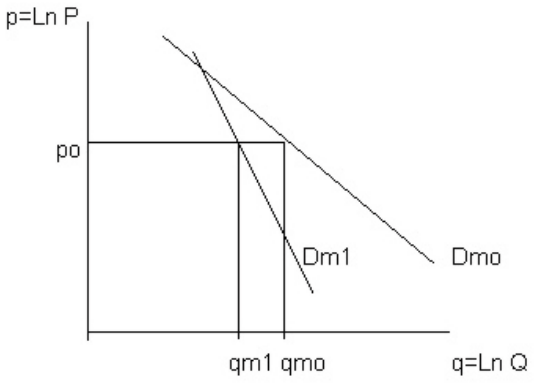


Second, we assume that the elasticities estimated with contemporary data do not reflect the entire adjustment of imports in the long-term, since the import demand respond to change in prices according to a distributed lag model. Some studies suggest that, in some cases, the "short-term" elasticity might be approximately "half" the "long-term" elasticity. Third, such a simulation of import increase implies that, in the new liberalised scenario, the countries would maintain their respective market share. Nevertheless, given that tariff dismantling would be asymmetrical (the EU would eliminate subsidies of the products considered regardless of its final destination, whereas MPC's tariff reduction would only apply to imports from the EU), the EU could loose its exporting capacity in some products, and MPC's demand could be reoriented

towards EU competitors, now more competitive with regard to EU's not subsidized exports. In short, it is possible that the changes in trade protection could affect trade flows, that subsequently causes changes in the international price of the considered products; this additional change is not incorporated in the previous estimation. An additional nuance has to do with the absence of exchange rate movements, which are assumed to be constant, even when the simulated hypothesis contemplates a modification of bilateral prices and import/export flows. The nominal exchange rate maintenance hypothesis implies, therefore, a permanent modification in real exchange rates of equal value.

In order to technically detail the specification and the estimation method used in the final model, some additional remarks should be done. First, the model specification has been completed for some countries/products with the incorporation of some additional variable, in particular, international reserves, either as a particular variable or expressed as a percent over GDP; in addition, an independent term has been added. Second, alternative specifications have been considered but finally rejected for not being statistically significant. In particular, we have tried to introduce variables such as the nominal exchange rate with the dollar for every country, or the price of national food-stuffs that substitute imported products.

Third, a panel data specification for 5 countries (Algeria, Egypt, Morocco, Turkey and Tunisia) has been used to estimate the model, using temporal data referred to the period 1991–2001. The choice of a panel data model has been based on the scarcity of available data, both for a transversal and temporal estimate, if the sample corresponding to the most recent years (last decade) was to be used as the relevant numeric base. On the other hand, a panel specification has been considered to be appropriate in a trade context with clear similarities among the analysed countries; all of them belong to a similar geographical area and have comparable level of economic development. Fourth, the panel specification allows us to consider a model of fixed, variable or common effects for all the transversal units considered (countries). After examining the properties of all the alternatives, a model with a variable coefficient (per country) has been chosen as the variable of Import Price, while fixed coefficients has been retained for the rest of them (independent common term, and income and reserve variables with common coefficients).

This specification allows us to capture the differences of the price-import elasticity term between countries, though the restriction of a common coefficient is considered for the rest of the exogenous variables and a common unobservable transversal heterogeneity. This hypothesis

must be considered clearly restrictive. Nevertheless a fixed or random effects specification turns out to be incompatible with a variable elasticity per country, because of the low degrees of freedom available. Finally, when using a model by levels, the hypothesis of transverse heterocedasticity is considered reliable. That is the reason why the estimation has been conducted with the Minimum Cross Section Weights method.

Once import /export elasticities have been calculated, we can proceed to calculate the import increase due to the trade price reduction, "ceteris paribus", without changes in the rest of exogenous considered variables (nominal income and/or international reserves). This calculation is carried out for the six scenarios considered in the previous section

III.b. - Effects on the public revenue

As the second effect derived from a tariff dismantling scenario, now we can easily calculate the decrease in public revenue derived from the tariff abatement considered in the simulation scenario. This calculation is not connected with the impact on employment, the main transmission channel of effects to the economy, but it can be significant in evaluating the overall consequences that agricultural trade liberalisation can have on these countries.

The MFN ad-valorem tariffs described in this section (III.b) are applied over the annual import quota, taking a 3-year average (99-01) in Euros at the average exchange rate.

IV. - EFFECTS ON EMPLOYMENT OF THE IMPORT ADJUSTMENT DERIVED FROM CHANGES IN INTERNATIONAL PRICES

Once the increase in imports derived from the reduction of international prices has been calculated, we can obtain the employment reduction originated by the substitution of national production by imports. In order to do that, we assume the simplifying hypothesis that employment in each sector decreases in the same percentage as production does.

To calculate the specific effects for each sector, it is necessary to know the population employed in each of them. Unfortunately, the agrarian statistics available for these countries are very limited and they provide the population employed in agriculture, but not its distribution by branches. Very precise data on this matter exists for some developed countries, with the information available for USA being exceptionally wide, mingling detailed information about

the cross “sector-occupied population”, with information about the different American states. In the case of the European Union, the effort carried out in this matter gives quite precise information at a national level, though there is not a homogeneous unit of measurement for the different EU countries.

In order to achieve reliable statistics in the matter, the FAO has carried out diverse surveys with differing results according to the information given by each of the consulted countries; but, in any case, involving a great amount of human and technical means to carry out the necessary "counting".

Concerning the generation of useful statistical systems to measure the current and the optimal exploitation of the land, important advances have been done thanks to “aero-thermic x-rays” of the geography of the different continental regions, associated with systems of complex mathematical calculation. Nonetheless, the number of people involved in each type of production is still a quagmire to be solved in this analysis, especially in the case of developing countries. In particular, out of the five countries in our study, partial information exists only for Egypt, with a poor disaggregation by product. Morocco, the second country that takes part in the FAO project, hardly offers any precise information about its agricultural census, with no information by product and data just for 1985.

Within the framework of this research, we propose a system to estimate the number of people devoted to each particular crop, using linear and square optimisation models that are compatible with the rest of the information available on the different crops; however they can only serve as useful reference for the simulation of different scenarios because, by construction, they admit diverse partial solutions also compatible with the observable reality. In any case, this approach is common to several studies about facts in agricultural production, as we can find, for example, in Ennew (1990) or Kennedy (1998).

Based on the total population occupied in agriculture and the available data of cultivated land for each product, we proceeded to the distribution by crop of the total population using an optimisation linear method with a quasi-Newton algorithm. By means of this procedure the occupied population/area ratios were calculated for each type of crop (R1, R2, … … Rn):

$$R_i = \left(\frac{Occupied(S_i)}{Area(S_i)} \right)$$

so that:

$$Tot.Emp._t = \hat{R}_1 * Area(S_1)_t + \hat{R}_2 * Area(S_2)_t + ...\hat{R}_n * Area(S_n)_t$$

The optimisation was implemented by minimising the sum of the square residuals among the Real Total Occupied population and the ones derived from the calculation of those which are different (R_i) in the previous formula. Apart for minimising this function, the result obtained was modified to guarantee the following restrictions:

Positive Coefficients (R_i)

Residual Average 0

Coherent structure of Employment/Cultivated area ratios. To guarantee a minimal coherence of results among the different crops, the case of Spain was used as a reference in order to determine the most and the least intensive cultivation according to the available information. This restriction was used to offer the estimate procedure a minimum-maximum value range to guarantee the coherence of the solution adopted. This range is essential to compute the degree of desirable fluctuation in the result derived from optimisation, which is the range offered for the considered crops.

In relation to this, a series of limitations about the obtained results should be taken into consideration:

- Nature, strongly influenced by subregional climatology, provokes deep differences in the need for human intervention, even for the same type of crop in the same country. The same cereal might need to employ a variable quantity of people depending, for example, on the rainfall of the national sub-area, simply because of the greater or lesser frequency of irrigation needed.

- The level of agricultural mechanisation is essential both for the determination of the highest productivity per person in a complete process of sowing-crop-harvest, and in the generation of scale economies with lower soil erosion, which holds greater ease for the crops in subsequent years. As an example, the clearing work of an average cereal field in Castille 30 years ago would require 340 hours for weeding and a 1 or 2 month period for soil recovery, in contrast with the 50 hours needed nowadays, and no time needed for soil recovery as the clearing process is much less aggressive than it used to be.

- The seasonal nature of agriculture, as well as family work not registered in the census, makes it especially difficult to quantify the number of people occupied in this sector, even more so when we make this estimate for developing countries. To solve this problem it is common to use concepts like Agricultural Work Unit (AWU) as an average estimate of a continuous annual occupation comparable to 40 hours a week of those people occupied in other sectors.

- In several productive schemes different types of product coexist, with higher or lower intensity, carried out by the same agricultural enterprise and using the same number of people. This situation is more frequent in those bordering climatic regions in order to make it possible for the coexistence of completely opposite crops in terms of the amount of water needed. Statistically this fact has an influence on the problem of the additive effect of the results of a proportional distribution, though submitted to observable restrictions, as the one achieved by the optimisation model.

Once the Employment/Area ratios are determined, employment by crop can be calculated. Then, the adequate percent reduction may be applied to employment by sector, derived from the percent increase of imports as a consequence of the adjustment in international prices. For this task, we will assume that this import increase will not cause any adjustment in the national production as far as it matches the reduction in prices. However, any excess over this adjustment will inevitably mean the destruction of national production.
Within this framework, and although we are conscious that the optimisation system used is capable of offering multiple results, the solution of the parameters is coherent with the recent history of these countries. Also, in a certain way, it respects the labour intensive characteristics needed because of the nature of the crops (according to the existing distribution in Spain, with sufficient statistical data). At the same time, it appropriately represents the specific distributions of population in the countries subject of this study.

The estimation is a way to comply with the known statistical reality and its historical dispersion in the last ten years, being technically credible given the lack of information about the topic. Some experts suggest to distribute the population from the studies of the average labour force required for each type of crop according to technical standards. Nevertheless, we have decided to use mathematical optimisation understanding that, in the countries that we are studying, the characteristics of regional population distribution and economic inefficiency in the cultivation of crops are the points that we wanted to make clear. This clashes with attributing to MPC's agriculture any technical share-out of the number of farmers needed for each type of crop.

Therefore, considering that the import/price elasticity is greater than one for some countries, we understand that this percent difference in elasticity with regard to one is to be transferred to the reduction in national production.[32] Once the percent reduction of national production has been quantified, as well as the whole agricultural population dependent on each crop, we will assume that employment is destroyed in each product in the same proportion as production.

V. CHAIN EFFECTS DERIVED FROM EMPLOYMENT ADJUSTMENT AND PUBLIC INCOME REDUCTION IN MPC`s ECONOMIES

Once we have determined the changes in national employment per crop, derived from the replacement of national production by imported production, as well as quantified the decrease in State revenue due to the tariff reduction, we can proceed to calculate the global impact that these adjustments will have upon MPC's economy. This analysis is carried out using an Input-Output table of the analysed country in order to detail the adjustments in each of the components of aggregated demand and employment, both in total terms and by branches.

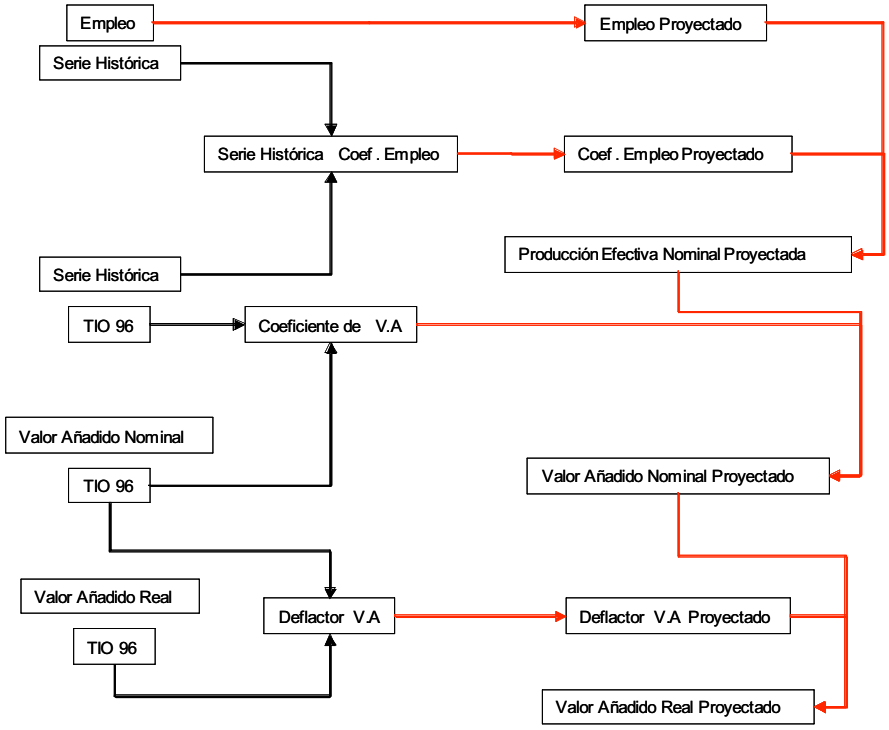
V.a.. - Generation of the baseline scenario of prediction and employment coefficients

The use of Leontief's (1936) Input-Output demand model implies, by definition, the use of a static vision of the economy. When a simulation for a medium-term period is needed, as in this case, this static nature reduces the quality of the results for the considered period, unless some components of the Input-Output apparatus are dynamised in a suitable way. The quantitative procedure proposed in this article takes into consideration the future projection of some static elements of the Input-Output scheme. This projection has to be carried out carefully, to guarantee the coherence among the economic essential variables that will define the scenario throughout the years used in the simulation. One of the aims of this section is precisely to illustrate such a coherent scheme, indicating the sources of exogenity of the simulation exercise.

The following graph shows the outline of links among the main variables that will be used in the design of a simulation scenario. On the left, the relations among the series and/or historical data are presented, whereas on the right, and underlined in red, we have the links among the same variables in projected terms:

[32] It should be noted that we start from the premise that no nominal income increase exist, so that the overall income dedicated to imports plus the national consumption of agricultural products have to be constant.

Relations among historical series **Relations among projected series**



In order to give more detail and facilitate the understanding about the scheme's prediction mechanisms, the following should be mentioned:

The projections of the sectoral employment series and the corresponding employment coefficients (ratios between Employment data and Current Effective Production) have been carried out via trend adjustment, linear in the case of employment, and logarithmic in the case of the coefficients.

The sectoral Added Value coefficient, which is the result of the Current Added Value divided by the Current Effective Production of each sector, has remained constant in the forecast horizon from its value in the 1996 Input-Output tables.

The projection of the Added Value Deflator for each sector has been carried out maintaining its coherence with the values of the observed series in the forecast horizon for the productivity by branches.

We tried to reach a consensus about the design of the forecast scenario with the information offered by other sources of analysis, like the World Bank or the IMF, at least concerning the main macro-magnitudes in the forecast horizon.

In the forecast horizon, estimates on the Wage Remuneration by branches[33] were carried out to complete the design of the simulation scenario, which was out of the coherence scheme between value added and employment coefficients. In this sense, it was assumed that the hypothesis of wage growth would be maintained at the same levels as the growth of the value added sectoral deflators. Finally, recent data on the marginal propensity to consumption in the whole economy and the tax pressure was computed in order to calculate which part of the income generated would be intended for consumption, obtaining in this way a quantification of the income available for consumption:

$$\nabla YDH_t = wages_{jt} * (1 - s) * (1 - PF_t)$$

where:

wages: Salary in sector "j" per employee

s: Household marginal propensity to save.

PF: Direct tax pressure in the nation (direct taxes and social security over gross income).

V.b.- Effects on the national economy: simulation using dynamised Input – Output tables.

The Input considered in this simulation exercise, using Input-Output tables (I-O Tables) is the suppression of income intended for consumption as a result of the reduction of agricultural employment.

V.b.1.- Effect on National Production and National Value Added

The reduction in income dedicated to consumption is distributed by sectors in the national economy, based on the consumption structure defined by the I-O Tables in the consumption vector, once import component has been deducted. This initial shock causes a **DIRECT EFFECT** of income reduction in each sector, attributed to each of them from the vector of consumption proportions calculated in the corresponding I-O Table, once the part covered by imports has been deduced:

[33] Using the historic data in ILO's LABORSTAT.

$$Coef.Consumo = \frac{CF_j}{CT}$$

$$Coef.\text{Im}portación = \frac{M_j}{\text{Pr}oduction_j}$$

From these constant coefficients of the final consumption in sector "j" with regard to the total consumption in the economy and the coefficient of imported production in sector "j" with regard to its production as a whole, there is a distribution in every productive sector of the income reduction intended for consumption in the national economy:

$$\nabla Demand_j = \nabla YDH * \frac{CF_j}{CT} * \left(1 - \frac{M_j}{\text{Pr}oduction_j}\right)$$

Likewise, the cross-sectoral links derived from the matrix of intermediate consumption lead to production reduction in other sectors due to the decrease in demand for suppliers. This is the **TOTAL EFFECT**, which is the reduction in the total production due to the fall in the consumption demand. To introduce this effect, Leontiëf's model of demand is applied:

$$\nabla production = (I - A)^{-1} demand_j$$

$$A = \begin{bmatrix} a_{1,1} & & a_{1,19} \\ & .. & \\ & .. & \\ & & a_{19,19} \end{bmatrix}$$

a_{ij} *: As for the purchases of sector "i" to "j" with regard to the total effective production of sector "i".* $a_{ij} = \frac{purchases\ \text{from"i" to "j"}}{\text{prod "i"}}$

Calculating the difference between the Total Effect and the Direct Effect, we obtain the **INDIRECT EFFECT,** which represents the reduction in production in the second derivative of the fall in direct demand applicable to each sector; that is, the reduction of inter-industrial demand of the suppliers in the sectors directly affected by the fall in its final demand. From each of these three effects on total production, we obtain the corresponding effects on the value added from the direct product of the value added constant coefficient on production, obtained

from the I-O Tables. Likewise, as for employment, each of the previous effects influence employment from the corresponding product by the employment coefficient in the year analysed.

V.b.2.) Demand-induced effect

The employment suppression in the previous stage causes a new demand decrease in final consumption by national employees, repeating once again the whole process, starting at the reduction of the available income for consumption, derived from employment decrease in each sector because of its corresponding wage remuneration in the year analysed.

VI. A SELF-CRITICISM ON THE MODEL: ADVANTAGES AND RESTRICTIONS OF THE PROPOSAL

This modelling system includes a great quantity of statistical-econometric tools in order to obtain a credible economic framework for the functioning of a national economy, linking its external and internal implications. The system represented shows a mechanism of closed resolution, although it is capable of being completed by other branches derived from the obtained outputs that, in any case, were not an object of this research (we might include effects on agricultural world imports of the CAP dismantling, effects of trade diversion in the different world areas, employment adjustments in the EU, incentives for the reorientation of the investment flows in the Mediterranean, etc.).

The above mentioned system can clearly be divided into three sub-models:

- The sub-model of international prices and changes in import volume of agricultural products, both from the EU– world and the EU- MPC perspective.
- The sub-model of optimisation for the determination of occupied population in each type of crop in the MPC's, and the calculation of the number of farmers at risk of being displaced by imported production.
- The sub-model of the national impact on income reduction previously devoted to consumption, also generalized to the quantification of the globally linked economic effects of employment reduction in a specific economic sector.

With regard to the first sub-model, the modelling presented is only oriented to this research and responds to the double objective of simplicity and particularity in the treatment of agricultural

products. It is a generally recognized fact that the modelling strategy must be “from specific to general”, and not the opposite. In this type of analysis, it is needed to generate behaviour equations which are adaptable to the traits of each agricultural product, considering it with maximum disaggregation. This is so because in every variety of the same product, there are an enormous variety of distinctive characteristics that can not be ignored (season of the year, quality, durability, degree of penetration in the different markets, etc.).

The structure presented regarding the determination of international prices solves, with enough statistical guarantees, one of the main problems faced in the modelling of agricultural products: to determine its volatility. In this way, the fundamental factors from the filtered data break off in a statistical series. In our case, the employment of a Hodrick-Prescott filter turns out to be extremely useful for the nature of the series we are dealing with (enormously volatile series in spite of using yearly data). The uni-equation structure for each product gathered in this study turns out to be especially appropriate in this case, obtaining detail of the specificity of each good, with ample statistical adjustment.

In this stage, we accomplish the determination of the effects of suppressing domestic support in the EU in view of determining the international prices of agricultural products. Of course, it is now necessary to add the effects of tariff suppression in EU-MPC’s relations. Though the mathematical implementation is simple from the quantification of tariff restrictions in an *ad valorem* ratio, it is precisely this quantification that can be the most controversial point. We think that the tariff assessment carried out, though it might be subject to multiple discussions, responds to a transparent and objective mechanism. Therefore such quantification allows the design of a plausible simulation scenario, though it is necessary to design other scenarios in order to face the quantification of political measures, changing the levels of tariff protection based on more specific knowledge of a specific product and a subjective evaluation of non-tariff protection.

In order to determine import elasticities, as opposed to changes in prices, the panel data model with common effects applied is associated to several technical and operative advantages in our experimental design. On the one hand, it allows us to respond to the distinctive reality of products and countries considered by estimating a specific parameter of import/price elasticity in each case. For such a heterogeneous group of countries, this type of “parametric flexibility” should not be taken as something sophisticated, but as a fundamental element for the quality of the inference exercise. On the other hand, the combination of temporal and transversal samples is presented as a more efficient and reliable strategy of estimation than the simple unidimensional analysis. This more so when considering the important limitation derived from

the few statistical temporary or transversal observations of a statistically homogeneous nature available for each type of product.

Within this framework, we can accurately obtain the import growth for each crop in a precise way, which other more generalist models do not deal with. This situation is clearly desirable in the context in which the model is applied, since it is necessary to specify the type of crops affected in order to define the different palliative policies for the eventual socio-economic negative consequences. Within the MPC's, where the effects of external purchasing increase on the national economies are well determined, knowing what type of crops will find themselves reduced and, in turn, how many farmers will be affected by this reduction, it is the milestone to develop economic policies in the area.

It is in the mind of all the political negotiators to provide a more transparent trade system that generates a framework of peace and security in the Mediterranean, based on sustainable economic development[34]. In this context, the economic problem of migration, both internal (within MPC's) as well as external (from MPC's to the EU), requires especially cautious treatment, since an accelerated departure of "ex-farmers" towards urban nuclei is a seed of marginality and acceptance problems in the North, and a catalyst of fundamentalism in the South. Precisely, the second sub-model allows us to analyse these effects, determining what type of population is implied, ant to what extent. Unfortunately, the statistics available does not give sufficient details to make a direct transfer of those effects to employment destruction for each type of crop.

The solution raised in our modelling strategy grants a possible scenario for the distribution of this population between crops. The restricted parameters optimisation mechanism through partial indicators on this reality provides the required mathematical guarantee. It allows for the creation of a system which is compatible with the logical limits of using developed countries as referents. In other pieces of research, the solution adopted with regards to this point is based on the direct transfer of the ratio of number of people needed (or habitual) to grow a certain type of crop in accordance with agronomic studies. This translation seems to be especially inadequate in the context in which we are working. The crops in MPC's are characterized by the excess of agricultural workers devoted to a particular crop, inherited from an inefficient system and from

[34] See conclusions of the 1995 Barcelona Conference for the creation of co-operation in the Mediterranean.

a higher proportion of the population employed in agriculture, common in lower stages of development (in all the MPC's, this ratio is higher to 35 % of the population).

Finally, the third sub-model (impact of the destructive effect of farm labour to the national economies) allows for the compatibility of information on the economic structure of the country using the I-O Tables, and is dynamised with the use of the evolution coefficients of the number of employees per sectoral product. This is a technically brilliant system to improve the "fix picture" restrictions (no evolution) that are normally criticised in the applications of Leontief's demand models. It clearly improves the analysis when compared to the models of general computable equilibrium, profusely used in the last few years.

Regarding the previous statement, it is fundamental to stress the importance of the estimation method for the employment coefficient. It represent the milestone to determine the number of employees affected in the whole economy and the associated income consumption losses. In the strategy previously presented, the system to attain these employment coefficients responds to a double mechanism of adjustment. First, from the historically known coefficients and the ones obtained from the distribution of the predictions on the global growth of economies that are published by major international institutions (IMF, The World Bank, United Nations LINK Project, etc.). Second, from a projection of the employment coefficients in the forecast horizon, with the restriction of not exceeding the current coefficients in developed countries and maintaining the historical trend evolution of the series.

Once again, the results obtained are technically appropriate as a simulation framework for alternative policies and the quantification of the effects due to changes in the size of agricultural subsidized production and the levels of tariff reduction.

The translation of the effects of employment destruction to the national economy is quantified in a coherent forecast horizon in which wage income is determined from the growth in sectoral prices, which is compatible with the productivity growth that the estimated employment coefficients imply. In this way, the system allows a distribution of previsions of the international organisations, in practically any case generated from demand models, to the supply factors of each country.

To conclude, the model as a whole presents a coherent system of simulation of agricultural liberalisation policies in the Mediterranean from the point of view of determining the increase in exports of EU products and the losses in MPC's agricultural sectors and its translation to their

economies. Surely, the mechanism can be completed with slight changes in the international prices sub-model to analyse opposite effects. For instance, MPC's export increase in those Mediterranean products where they enjoy comparative advantages and the determinationof the resulting profits for MPC's economies.

ANNEX 1.-LOGICAL CHAIN OF THE EQUATIONS USED FOR A SIMULATION

1. Change in the PSE and generation of international prices.

$$Log(P_{it}) = \alpha_0 + \alpha_1 \log(PSE_{it}) + \alpha_2 \log(EUP_{it}) + \alpha_3 HPP_{it} + \varepsilon_{it}$$

2. Identity for the calculation of the tariff change effect and the suppression of the domestic support on the EU – MPC's generation of prices.

$$\nabla P_{it}^{UE-PTM} = \Delta P_{it} - \nabla tariff(\%)$$

3. Estimation of import increase per product (QR)

$$\ln QR_{ij} = \hat{\beta} \ln P_{ij}^{UE-PTM} + \hat{\gamma} \ln PIBRj$$

4. Identity for the calculation of the fall in public revenue. (GI)

$$\nabla GI_{ij} = QR_{ij} * tariff_{ij}$$

5. Optimal restricted estimation of destruction of national employment (per crop "j").

$$Tot.Emp._t = \hat{R}_1 * Area(S_1)_t + \hat{R}_2 * Area(S_2)_t + ...\hat{R}_n * Area(S_n)_t$$

$$\nabla emp_{jt} = R_j * Tot.Emp._t * (\hat{\beta} - 1)$$

6. Destruction of wage income in sector "j" intended for consumption (at first, only in agriculture).

$$\nabla YDH_t = wages_{jt} * (1 - s) * (1 - PF) * \nabla empl_{jt}$$

7. Distribution of the destruction of final demand (private consumption) by the different economic sectors (First Direct Effect on the national production).

$$\nabla Demand_j = \nabla YDH * \frac{CF_j}{CT} * \left(1 - \frac{M_{j,1996}}{\Pr od_{j,1996}}\right)$$

8. Estimation of the total effect upon the country of reduction in personal consumption (uniting direct effects–demand - and indirect effects - from the cross-sectoral supply).

$$\nabla prod_t = (I - A)^{-1} demanda_{jt}$$

9. Identity to determine the indirect effect.

$$EI = ET - ED$$

10. Translation of the decrease in production to value added for each effect (direct, indirect and total).

$$Coef.VA_j = \frac{VA_{j1996}}{\Pr od_{j1996}}$$

$$\nabla VA_{jt} = \nabla prod_{jt} * Coef.VA_j$$

11. Estimation of the number of employments destroyed by the production decrease[35] for each effect (direct, indirect and total).

$$Coef.Emp_{jt} = \frac{Empl_{jt}}{\Pr od_{jt}}$$

$$\nabla Empl_{jt} = \nabla prod_{jt} * Coef.Empl_{jt}$$

12. Identity of the income for consumption suppressed from the system (in this case, including all the economic sectors).

$$\nabla YDH_t = wages_{jt} * (1 - s) * (1 - PF) * \nabla empl_{jt}$$

13. New inclusion of this demand-induced effect in the I-O Tables (2nd derivative).

The system would be repeated from point (7) of this scheme, to end on point (12).

Glossary of variables:

P_{it} :	International trade prices (world total) of product "i" in period "j".
PSE_{it} :	Product Support Estimate for product "i" in period "t".
EUP_{it} :	Trade price for product "i" in period "j" in the EU, before a tariff dismantling and/or reduction of domestic support.
P_{it}^{UE-PTM} :	Trade prices for product "i", between EU and MPC country "j" in period "t".
$tariff_i$:	Tariff applied to product "i".
QR_{ij} :	Actual import volume of product "i" in country "j".
$PIBR_{jt}$:	Per capita GIP of country "j" in period "t".
GI_{it} :	Public incomes from product "i" in period "t".
$Tot.Emp.$:	Total population devoted to agriculture.
$\hat{R}_j$:	Ratio of population occupied in product "j" in relation to the total population engaged in agriculture.

[35] Annual employment coefficients have been calculated from a potential decreasing function (with a sampling adjustment above 95 %) and taking into consideration that at the end of the projection period a higher or similar value to the ones in developed countries will be obtained.

$Area(S_j)_t$: Hectare of cultivated area “j” in period “t”.

emp_{jt} : Number of employees in crop “j” in period “t”.

YDH_t : Available income for consumption in period “t”.

$wages_{jt}$: Wages per person in sector “j” in period “t”.

s : Propensity to save (in percentage)

PF : Tax pressure (direct plus social security, in percentage)

$Demanda_j$: New final demand of sector “j” (in final consumption and, here, in negative).

$\frac{CF_j}{CT}$: Ratio of the national total consumption of products in sector “j”, according to the I-O Tables.

$\frac{M_{j,1996}}{\Pr od_{j,1996}}$: Production ratio of sector “j” of imported origin according to the I-O Table base.

EI : Indirect Effects

ET : Total Effects

ED : Direct effects

$Coef.VA_j$: Added value Coefficient of sector “j”.

VA_{j1996} : Added Value of sector “j” in year 1996.

$\Pr od_{j1996}$: Production of sector “j” in year 1996.

VA_{jt} : Added Value of sector “j” in period “t”.

$Coef.Emp_{jt}$: Employment coefficient (number of occupied population needed in sector “j” to generate a billion pounds-production in this sector).

$Empl_{jt}$: Employment in sector “j” in period “t”.

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RESULTADOS DE LA SIMULACIÓN DE UNA LIBERALIZACIÓN PROGRESIVA DE LAS TARIFAS EQUIVALENTES EN EL CASO DE MARRUECOS

AGREEM – MODELO AGRI-MED
Draft (not quotable)

	2006	**2007**	**2008**	**2009**	**2010**	**SUM**
Tariff Reduction *(Percentage)*	1,21	2,41	3,62	4,83	6,03	18
Tomato Exports Increase *(Mill of euros)*	12,6	25,2	37,7	50,3	62,9	189
New Added Value *(Mill of euros)*	13	27	40	53	67	200
New Employment *(Persons)*	291	577	855	1.135	1.410	4.267

- Poverty reduction in agricultural population
- Migration policies implications
- Compensation measures in “losers countries”
- Quality requirements in EU
- Distribution Chains ownership: poor added value benefits