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Institutional Agreements and Evolution of the Spanish Maize Sector

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Abstract: Spain's accession to the EC in 1986 turned out to prove soon enough, in practical terms, the logic of the Customs Union Theory. Substantial reductions in maize imports by Spain, mainly from the USA and, to a lesser extent, from Argentina, fuelled the world agricultural trade conflict. Under GATT Article 24/6, the USA and EC agreed on a quota of 2 million tons to be purchased by Spain from non-EC sources at lower prices. This institutional agreement, together with regulations contained in the Accession Treaty, were considered in the analysis of expected trends of the Spanish maize sector during the transition period. Although only crop producers, livestock producers, and taxpayers were considered, the analysis seems to support the view that the last two groups will suffer welfare losses whereas crop producers will obtain welfare gains. However, differences between positive benefits (crop producers) and negative benefits (livestock producers) due to the gap between world prices and Spanish policy prices will become gradually smaller as the transition period (1986-92) comes to an end.

Introduction

The main purpose of this paper is to project the evolution of the maize sector in Spain during its transition period of accession to the European Community; i.e., from 1986/87 to 1992/93. The projection takes into account both economic and institutional, domestic and international factors that are likely to contribute to the shaping and performance of this sector. Analysis of internal conditions of supply and demand (in terms of elasticities and structural changes) and the expected evolution of Spanish farm support (i.e., prices and subsidies to be aligned to those in the EC) are thus complemented with some assumptions involving world prices, rates of exchange, and EAGGF² decisions on guarantee measures.

The issue has implications that go beyond domestic or even European borders, as it constitutes an interesting example of one of the various areas of conflict between the two main agricultural trade powers, the USA and EC, during the last few years. This issue can be placed in a context of recent disputes concerning international trends on agricultural trade shares.

US export sales declined dramatically in a number of agricultural markets over recent years. Analysis of the reasons behind this situation lies beyond the scope of this paper. However, the integration of Spain into the EC has meant for the USA a further loss of its market shares abroad. Thus, invoking Article 24/6 of GATT, the latter forced an agreement with the EC, whereby the new members, Spain and Portugal, would benefit from a reduction in the CAP's variable levies on cereal imports from third countries. In the case of Spain, the agreement was established for the 1987-90 period on the basis of 2 million tons of maize and 300,000 tons of sorghum, although these quotas allow for other feed substitutes.

Future developments in the Spanish maize sector will be strongly influenced by two different sets of forces: operation of the market system, and institutional agreement (i.e., Spanish agricultural policies aligned to those of the EC's CAP, and the US-EC agreement under the GATT Article 24/6). The model is an attempt to integrate those conflicting forces into a coherent set of relationships, so that the evolution of the sector and its effects on the main agricultural groups involved can be assessed.

Model

The economic analysis of the maize sector is based on a framework of quantitative relationships in which the main characteristics of the sector are reflected through a set of dependent variables: production, consumption, trade, prices, costs and benefits to consumers, producers, and taxpayers, and intervention costs. The time scenario goes from 1981 to 1992: a period of five years prior to accession (1981-86) and a transition period of seven years, as established in the Accession Treaty by Spain and the EC. The analysis of

the first period has two objectives: to serve as a basis for and to make comparisons with projections of the second period, and to test the model. During the second period, however, the aim is to phase in the alignment of Spanish agricultural policies to CAP regulations. Projections to 1992 are intended to show the economic effects on the maize sector induced by the new set of agricultural policies adopted by Spain.

The complete model is run in a spreadsheet generated in Lotus 1-2-3 and contains a set of five tables in descending order (Josling, 1988).³ The first table is a block of parametric assumptions and actual data intended to "feed" the rest of the model: policy and world prices, rates of inflation, elasticities of supply and demand, population, real income, feed demand, and trade shares with the EC and third countries. The data are either expressed in growth rates or fixed parameters for the whole period.

Operative CAP price. Intervention prices were chosen as the operative price. Threshold prices are much closer to market prices than intervention prices when the country is a net importer, as in the case of Spain. Moreover, although threshold prices are somewhat higher than market prices, the difference could be ignored, bearing in mind that Spain will benefit during the first four years of the transition period from some reductions in the variable levies applied to world prices. However, intervention prices are much more stable and represent the worst possible situation for crop producer income.

World price. International maize prices are very much influenced by internal levels of US farm support. Loan rate fluctuations in that country can thus be taken as a proxy for those in world prices. Assumed rates of growth during the transition period equal the 1986 loan rate.

Exogenous supply shift. This is a comprehensive term, accounting for a variety of factors that influence production; i.e., opening of new lands to irrigation, new hybrid varieties, and substitution of wheat by maize in some areas of Spain. An increase of 15 percent in production is expected in the next five years, although the average annual rate of increase during the last decade was 8 percent. However, an annual rate of growth of only 4 percent has been adopted because Spanish maize yields are already close to EC's yields (Josling and Andrada, 1987). The likely upwards trends will thus become increasingly harder to attain.

Elasticities. Values for elasticities were taken either from other studies, when available, as in the case of supply elasticity (Wesley *et al.*, 1980), or were estimated (income elasticity of food demand)⁴ or were assumed by reference to neighbouring countries (price elasticity of food demand). Consumption increases due to population growth were projected by assuming stability in per capita consumption levels.

Trade shares. In the case of a country like Spain, which is a net importer, percentages included in the assumptions (Table 1) will mainly affect EAGGF earnings through collection of variable levies. The 98 percent from third countries is actually the "Extra-Community Trade Share" during the last marketing year, which is not expected to experience significant changes through the transition period, as the USA is sure to try to maintain its export shares in international markets.

Feed demand. The value of this parameter was estimated by considering expected trends in Spanish livestock production, given current levels of self-sufficien-

Table 1-Assumptions and Data

Country	Spain
Commodity	Maize
Operative CAP price	Intervention
1986 per capita national income (market prices)	\$5,198
1981 population	37,616,947
Annual rate of change (percent after 1981)	0.500
Annual rates of inflation (1987-89)	5.000
(1990-92)	4.500
World price growth (percent, in current dollars)*	1.800
CAP price growth (percent in current ECUs)*	0.000
Price elasticity of supply	0.600
Exogenous supply shift	4.000
Price elasticity of food demand	-0.300
Income elasticity of food demand	0.250
Real per capita income growth (percent per year)	2.000
Demand shift due to population growth (percent per year)	0.500
Intracommunity trade share (percent)	2.000
Extracommunity trade share (percent)	98.000
Annual feed demand growth (percent)	0.766

*Annual rates after 1985.

cy and the alignment of prices (they are now lower in Spain) during the transition period. Maize feeding patterns were also taken into account.

Table 2 is the physical balance of the commodity: supply, demand (food and feed), net imports, and self-sufficiency ratios. Projections for production are based on an average of past performance, while production is linked straightforwardly to changes in net producer prices through its supply elasticity and to the term labelled "exogenous supply shift." Food consumption is also projected according to its corresponding prices and elasticities. Feed demand, however, is based on a fixed rate of growth. Closing stocks are assumed to be a certain share of production, following similar trends to those in the past. They are included in the amount of maize supplied the following year as opening stocks. Finally, net imports are the difference between supply and demand. Self-sufficiency ratios are also included for illustrative purposes.

Table 2-Physical Commodity Balance (Maize)

Year	Production	Stocks Carryin	Consumption			Stocks Carryout	Net Exports	Self- Sufficiency Ratio	
			Nonfeed	Feed	Total				
----- Tons -----									Percent
1981	2,156,800	832,000	544,000	7,000,000	7,544,000	1,041,800	(5,597,000)	29	
1982	2,330,100	1,042,000	520,000	6,980,000	7,500,000	700,100	(4,828,000)	31	
1983	1,803,400	700,000	506,000	5,478,000	5,984,000	112,400	(3,593,000)	30	
1984	2,529,000	112,000	670,000	4,620,000	5,290,000	404,000	(3,053,000)	48	
1985	3,300,000	380,000	700,000	5,207,000	5,907,000	471,000	(2,698,000)	56	
1986	3,200,000	471,000	726,110	4,300,000	5,026,110	344,890	(1,700,000)	64	
1987	3,254,281	344,890	741,735	4,332,938	5,074,673	439,679	(1,915,181)	64	
1988	3,278,845	439,679	761,187	4,366,128	5,127,315	422,053	(1,830,843)	64	
1989	3,303,508	422,053	781,160	4,399,573	5,180,733	409,538	(1,864,710)	64	
1990	3,337,238	409,538	800,607	4,433,274	5,233,890	431,299	(1,918,404)	64	
1991	3,371,220	431,299	820,549	4,467,232	5,297,781	429,199	(1,914,461)	64	
1992	3,405,455	429,199	840,999	4,501,451	5,342,450	431,988	(1,939,785)	64	

In Tables 3 and 4, prices and welfare changes, respectively, lie at the heart of the model. Defined relationships among prices and between prices and policy instruments allow for empirical estimation of the dependent variables included in the benefit distribution table (Table 5). Table 3 is structured into several sets of prices, subsidies, and marketing margins. Table 4 is just a reflection of Table 3. It shows prices in Table 3 in terms of year-to-year changes, in local currency and dollars. Finally, Table 5 contains some relevant concepts for policy-making decisions. This table is mainly concerned with financial flows and welfare changes in the two main conflicting groups on the supply side: crop and livestock producers. Calculation of financial flows (i.e., farm receipts, feed expenditure, foreign exchange earnings, national budgets costs, and transfers to EAGGF) is straightforward. Welfare changes (i.e., producer and "consumer" surpluses) and implied costs and benefits from both the EC's and all policies were estimated using a Marshallian approach.

Results of Analysis

The *physical balance* of the Spanish maize sector under the base scenario can be seen in Table 2. Maize production in Spain would grow by 1992 up to 3.4 million tons, almost a 100-percent increase over 1981. On the other hand, global consumption could be approximately 5.3 million tons, also at the end of the transition period. Feed consumption represents some 84 percent of total consumption. It is mainly used to feed broilers and layers. Supply, then, has to meet utilization levels by importing large, though gradually smaller, quantities of maize. However, as net imports were calculated as a residual of

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Table 3-Prices

Year	Crop Producer Receipts	Feed Expenditure	Foreign Exchange Earnings	Budget Costs		
				National	EAGGF	Total
----- 1,000,000 real local currency units -----						
1981	61,331	265,403	-117,813	-59,027	0	-59,027
1982	77,789	310,699	-101,265	-77,825	0	-77,825
1983	52,068	210,883	-83,132	-32,132	0	-32,132
1984	55,694	135,657	-62,514	-12,190	0	-12,190
1985	64,754	136,231	-50,975	-7,848	0	-7,848
1986	57,077	102,264	-33,692	0	-12,803	-12,803
1987	55,817	99,091	-36,499	0	-15,259	-15,259
1988	53,197	94,449	-33,004	0	-15,518	-15,518
1989	50,695	90,021	-31,795	0	-14,544	-14,544
1990	48,670	86,207	-31,087	0	-13,813	-13,813
1991	46,723	82,550	-29,481	0	-12,703	-12,703
1992	44,849	79,045	-28,385	0	-11,839	-11,839

Table 4-Welfare Changes (from previous year)

Year	Crop Producer Welfare	Livestock Producer Welfare	Budget Increase	Net	Crop Producer Welfare	Livestock Producer Welfare	Budget Increase	Net
1,000,000 real local currency units					----- Dollars per capita -----			
1982	10,871	-45,829	-18,798	-53,755	31,749	-133,843	-54,899	-156,992
1983	-9,162	37,267	45,692	73,796	-23,301	94,771	116,195	187,665
1984	-14,492	45,847	19,942	51,298	-41,289	130,622	56,817	146,150
1985	-6,836	15,617	4,342	13,123	-20,596	47,053	13,081	-39,537
1986	-5,689	11,252	-4,955	608	-13,488	26,678	-11,748	1,443
1987	-2,166	3,916	-2,456	-705	-4,769	8,626	-5,409	-1,553
1988	-2,969	5,346	-259	2,117	-5,789	10,421	-505	4,128
1989	-2,832	5,100	974	3,241	-5,522	9,941	1,899	6,318
1990	-2,479	4,458	731	2,710	-4,833	8,691	1,425	5,284
1991	-2,382	4,273	1,110	3,001	-4,644	8,330	2,164	5,850
1992	-2,289	4,096	864	2,671	-4,462	7,984	1,685	5,207

Table 5-Benefit Distribution

Year	Produced by All Policies				Produced by EC Support			
	Crop Producers	Livestock Producers	Spanish Taxpayers	Total	Crop Producers	Livestock Producers	Community Taxpayers	Total
----- 1,000,000 real local currency units -----								
1981	28,419	-172,234	59,027	-84,788				
1982	42,118	-254,495	77,825	-134,552				
1983	21,387	-115,753	32,132	-62,234				
1984	15,192	-44,316	12,190	-16,934				
1985	14,822	-36,462	7,848	-13,692				
1986	19,558	-44,268	0	-24,710	19,558	-44,268	12,803	-11,906
1987	20,764	-47,683	0	-26,919	20,764	-47,683	15,259	-11,659
1988	21,849	-51,837	0	-29,988	21,849	-51,837	15,518	-14,470
1989	20,350	-47,903	0	-27,554	20,350	-47,903	14,544	-13,009
1990	19,066	-44,404	0	-25,338	19,066	-44,404	13,813	-11,525
1991	17,834	-41,084	0	-23,251	17,834	-41,084	12,703	-10,547
1992	16,651	-37,936	0	-21,286	16,651	-37,936	11,839	-9,447

internal supply and global demand, they show a great degree of stability through the whole transition period; they are consistently under 2 million tons. This is almost exactly the amount Spain can purchase from third countries at a reduced variable levy under the terms of the US-EC 24/6 agreement.

Some selected *financial effects* are expressed in Table 3. Crop producer revenue would fall by 30 percent between 1985 and 1992. This is because production increases cannot offset declining intervention prices. Livestock producers would benefit from a reduction of expenses of about 42 percent, also in the same period. This is due to lower wholesale prices, which largely compensate modest increases in feed consumption. Observed upward trend in the self-sufficiency ratio would allow for significant amounts of savings in foreign currency (in percent). Yet the CAP's variable levies applied to lower imports would mean a loss of revenues for the EAGGF. EAGGF would only collect \$109 million in 1992, as compared with \$136 million in 1987.

Annual changes in *welfare levels*, are included in Table 4. Crop producers would undergo decreasing rates of welfare losses during the transition period, whereas livestock producers would experience welfare gains, also at declining rates. The overall change of these two groups, plus the government, shows a positive change of welfare after 1988, with no clear patterns of change. If these changes are expressed in US dollars per capita, the overall average, after 1988, would be \$5,300. Livestock producers obviously take the largest share in such a gain.

Benefits accruing to crop producers from differences between world prices and Spanish policy prices are expressed in Table 5, together with the negative effects of such gaps for livestock producers. The monetary value of positive benefits is lower than that of negative benefits. Both taxpayers and livestock producers thus are "in charge," as it were, of supporting internal prices at levels well above those for world prices.⁵ Differences between positive benefits (crop producers) and negative benefits (livestock producers), however, become gradually smaller as the transition period is coming to an end.

This base scenario could be significantly altered by assuming different rates for growth for either world prices or CAP intervention prices.⁶ For example, an annual reduction in world prices of 5 percent (the current loan rate for maize in the USA) would result, *ceteris paribus*, in a hypothetical increase in EC subsidies, i.e., (for a net exporting country) of about 146 percent. Subsequent lowering of welfare levels because of higher budget costs would accelerate. Induced rates of decrease would sink to 73 percent. This widening of differences between world prices and CAP prices would bring about a benefit increase for crop producers of nearly 40 percent, while negative effects for livestock producers would escalate up to 60 percent.

On the other hand, if CAP/Spanish prices grew at 2 percent, annual average in nominal terms, instead of the zero percent growth in the base scenario, the following effects would occur: production would increase more than 70 percent; imports would decline almost 14 percent; self-sufficiency levels would be 69 percent (64 percent in the base scenario); the proportion of EC subsidies would increase (in the case of a country being a net exporter) by 30 percent; crop producer receipts would increase 21 percent and livestock producer expenses would increase 13 percent; foreign currency savings would decrease 2.5 percent whereas EAGGF revenues would be 13 percent higher; crop producers would experience welfare gains, but only in terms of a slowing down of 28 percent in their annual rate of welfare losses; livestock producers would accordingly worsen their situation, by speeding up their annual rate of welfare reduction to approximately 32 percent; benefit differences between crop producers (positive) and livestock producers (negative) would widen (crop producer benefits would grow 36 percent in real terms, whereas livestock producers would lose 32 percent); taxpayers would have to increase their contribution to the budget by more than 12 percent; and overall costs for the groups concerned (crop producers, livestock producers, and taxpayers) would increase by 51 percent as the results of the assumed 2 percent growth of the CAP's intervention price, in nominal terms.

Conclusion

Spain will continue being a net importer of maize despite dramatic increases in self-sufficiency ratios during the 1980s. Net imports will likely fluctuate around 2 million tons. The agreement between the USA and the EC concerning a fixed quota of 2 million tons to be purchased by Spain thus should not pose any obstacles to the stability of the Spanish maize market.

However, Spanish crop producers have already started putting some pressure on the Spanish government to reduce that level of imports. Whether they can succeed or not on imposing their own views on this issue will largely depend on the outcome of forthcoming talks at the Uruguay Round.

Notes

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²European Agricultural Guarantee and Guidance Fund.

³Only a reduced version of the model is presented here. Tables on nominal and deflated prices and subsidies are not included in this paper.

⁴Food demand is actually a simplification for all industrial uses of maize processing as well as food consumption proper.

⁵Final consumers are not considered in this analysis.

⁶According to regulations of the Accession Treaty between the EC and Spain, Spanish policy prices for maize will be aligned to CAP prices in 1988/89.

References

- Josling, T.E. (1988) "European Community Evaluation Framework: Software Documentation," unpublished paper, Stanford University, Stanford, Calif., USA.
- Josling, T.E., and Andrada, F. (1987) "La Política Agrícola Común y la Adhesión de España y Portugal," *Revista de Estudios Agrosociales*, No. 140, pp. 157-181.
- Wesley, E., et al. (1980) *Spain's Entry into the European Community: Effects on the Feed Grain and Livestock Sectors*, Foreign Agricultural Economic Report No. 180, Economic Research Service, US Department of Agriculture, Washington, D.C., USA.

Discussion Opening—Mark D. Newman (Abt Associates, Inc.)

Andrada and Cefia indicate that Spanish market prices are expected to be closer to EC threshold prices than intervention prices, implying a significant increase in producer prices relative to those in pre-accession Spain. Nonetheless, the analysis appears to be based on intervention prices. Support prices in Spain were only 4.5 percent below EC intervention prices when Spain began its transition to EC membership in 1986, so a smaller impact on production incentives would be expected if Spain were no longer an importer, so prices remained closer to intervention levels. The issue here goes beyond Andrada and Cefia's paper. The literature examining impacts of Spanish accession exhibits considerable confusion on what price should be used in the analysis.

Since Spain has been a net maize importer, accession should raise internal prices to closer to the EC threshold price. The agreement to permit a reduced levy quota of up to 2.3 million tons of maize and sorghum from outside the EC should offset some of the gain to Spanish crop producers that might be expected to accompany accession and higher market prices. The increased imports should push prices closer to intervention levels (although keeping them well above world prices). In this context, the authors' conclusions

are made more understandable. Higher prices resulting from the accession would have led to 20-percent production increases by 1992, but the predicted welfare losses by producers and welfare gains by livestock producers are relative to this increased price and production level, not relative to the absence of increased barriers to imports that accompanied accession to the EC.

As this is a single commodity, partial analysis, it does not consider the fact that accession permits imports of relatively cheap nongrain feed ingredients (called cereal substitutes by some) without the same levies faced by cereals. As the 24/6 agreement calls for the reduced levy quota to be cut by any increase in imports of certain nongrain feeds, an important component of the required calculus for examining welfare implications of the agreement for livestock producers is missing.

Enlarging the EC presumably offers a range of gains and losses to interest groups within and outside the EC. Spanish grain producers may get higher prices, but also a shift in competition towards higher cost EC sources of supply. To the extent that grain producers are also livestock producers, their input costs go up.

Interviews with feed and livestock producers in Spain in 1987 yielded two particularly striking observations. First, the market structure of the compound feed industry in Spain is such that technology shifted with amazing rapidity from the EC-10 to Spain on accession. Feed formulation is thus now using rations with a complex set of ingredients in response to the distortions in relative prices introduced by variable levies on maize and other grains, but zero or near zero levies on oilseeds and nongrain feed ingredients. The ability or inability to adjust will have striking impacts on certain participants and the overall structure of the Spanish feed industry. The aggregate analysis of welfare implications in the paper could not address these issues, but perhaps future analysis by others should.

Also meriting discussion are the international welfare effects of Spanish accession and the 24/6 agreement. Maize producers in the USA and Argentina obviously lose when their maize faces a levy of up to 200 percent of its world price to enter the Spanish market. The 24/6 agreement will offset some of the loss, as long as it is honoured. However, grain producers in France have complained bitterly that the agreement deprives them of market outlets that they gained in return for the increased competition that they will face from Spanish horticultural products as a result of accession. Negotiators for the USA and EC argue that the 24/6 agreement was the best achievable, while producers in Spain, France, and the USA complain bitterly. Perhaps this foreshadows some of what the MTN round holds in store. Do the political economics of accession and the 24/6 agreement provide insights useful in understanding what is possible in the Uruguay Round?

GENERAL DISCUSSION—*Ming-Ming Wu, Rapporteur* (Department of Agricultural Marketing, National Chung-Hsing University)

One participant underlined the importance of nongrain feeds and asked that new models account for shifts to nongrain feeds. In reply, the authors said that the issue has not been considered as far as building a parallel model is concerned. The usefulness of the model presented here lies in its ability to relate changes in the parameters with their impacts on producers' and consumers' welfare, so that the process of decision making can be assessed. Furthermore, even if *ad hoc* models could be designed, continuous changes in nongrain substitutes, together with significant changes in prices, would make the feed demand model of low workability.

Participants in the discussion included W. Gardiner.