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Impacts of the Luxembourg compromise on world markets for arable crops

The CAP reform (June 2003) in the arable crop sector is marked by implementation of decoupled payments and reductions to direct aid. These changes could affect not only the arable crop markets of the various countries of the European Union, but also world markets, and that in wheat in particular, since the EU is one of the main wheat exporters. To assess impacts on world markets for arable crops (and in particular on world prices), we used a partial equilibrium model developed at INRA, funded by the Ministry for Agriculture, Food, Fisheries and Rural Affairs and by Pluriagri (Trades Union). The consequences of reform on world markets are rather limited.

Research Object

One of the major characteristics of CAP reform (June 2003) is the implementation of decoupling of support, that is to say payment of individual aid irrespective of production volumes. More exactly, in the cereal crop sector, reform brings the following main changes: from 2005 onwards, introduction of a single payment per farm, regardless of production, reductions in direct payments (drops of 3% in 2005, 4% in 2006 and 5% from 2007), a 50% drop in monthly increments, withdrawal of the rye intervention and a 50% drop in the rice intervention price. These various elements will be implemented in 2005. This reform also accepts that some limited coupling is maintained. Member States will be able to keep a link between aid and production, within certain limits.

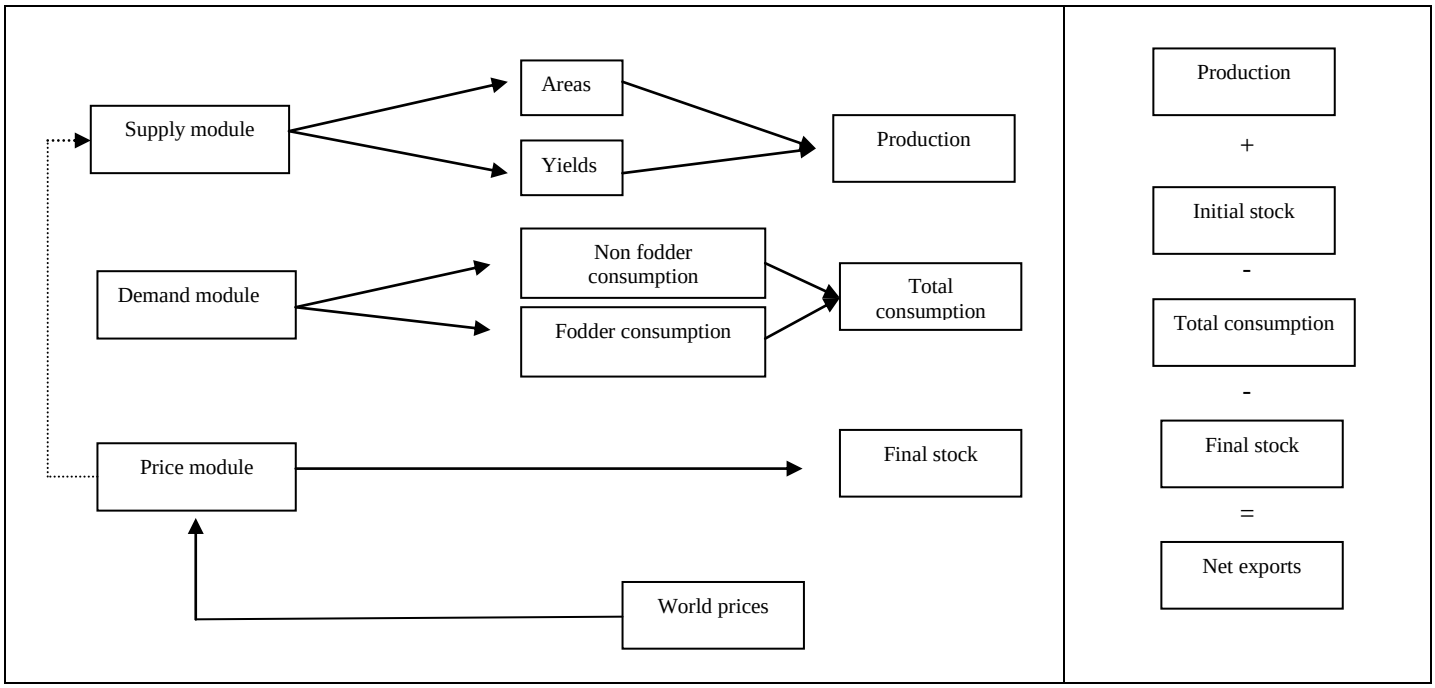
This research objective is to assess the effects of these modifications both on EU domestic cereal markets and on world markets, namely on world prices and the trade of other countries that are cereal producers. We study the consequences of two scenarios: i) a total decoupling scenario, where aid has no effect on production and ii) a scenario with partial decoupling, where aid has a limited effect on production.

Representation of the world markets in arable crops: use of a partial equilibrium model

The tool used to represent and analyse how world arable crop markets work is a multi-market partial equilibrium model called WEMAC: *World Electric Modelling of Agricultural Crops*. WEMAC is a dynamic, annual econometric model and may be used over the short or medium term. All the major countries importing and exporting arable crops are represented individually and some information on market variables (production, consumption, trade, prices) is provided. WEMAC can therefore be used for forecasting (in the absence of changes to the general economic conditions and policies of the main countries), and also for simulations (changes in the policies of the main agricultural countries, in the national or world economic conditions…). The tool therefore helps to comprehend changes in world markets for arable crops and, in particular, assess the impact of the CAP.

Box1: Model characteristics and consideration of the support instruments

The performance of a domestic market is summarised in graphs, where adjustment is made by net exports. Next, the factors explaining the main behaviour variables of the model are described.



Supply module
This module includes two relationships corresponding to the explanation of cereal and oleaginous crop areas and yields. The area estimates are based on a cropping pattern specific to each area, explaining the allocation of the arable crop area, with the latter being a given. The main factors explaining area allocation are arable crop prices and areas. For the European Union, payments per hectare are introduced in the area equations. Yields depend on arable crop prices deflated by the input price index and a trend.

Demand module
This module explains the national variations in fodder and non-fodder consumption and in industrial demand for the various crops considered. Non-fodder demand depends on the crop market price and income. Fodder demand depends on the indigenous gross production of various animal species, on the price of the crop considered and on the prices of other raw materials used in animal feed. The last demand component corresponds to the level of stocks which depend on the price of the crop in question and on the stock observed in the elapsed period.

Price module
This module explains the domestic price via a world price transmission equation. This equation includes any agricultural policy instruments when they exist. For example, in the case of the EU, the support price for production, determined as the intervention price including monthly increments, is included in that equation. This module also includes a price transmission equation between crop market prices and production prices.

Trade module
We usually distinguish between imports and exports. We estimate the “free” trade obtained by withdrawal of the trade agreement constraints from imports and exports. Imports mainly depend on the true income of the importing zone, on a price-competitiveness indicator (defined by the relationship between domestic and world price) and on the Customs duty applied to the crop. Exports depend on the foreign demand for the products of a country, on the export price-competitiveness indicator and the unitary amounts of the subsidies.

Settlement of each domestic market
To complete each regional model, we add the accounting equation describing market equilibrium (i.e. equality between resources and uses) to the behavioural equations. Also, to guarantee this equilibrium, a behavioural variable is determined residually from that accounting equality, with the other variables being predicted by estimations of behavioural equations.

Fixing of world price
The behavioural equations assessed per country, those determining the equilibrium on domestic markets and those describing equilibria on world markets define the world model. The comparison of regional models allows the determination of world equilibria and therefore of world equilibrium prices. All the equations are solved simultaneously to determine the various world equilibrium prices.

Regarding existing world models, one original feature of this project lay in the representation of the European Union: the modelling of the main EU producing countries, the differentiation of price effects and direct aid in the production module.

In the present version, the WEMAC model consists of nine regional (or national) sub-models linked by a system of global market equilibrium equations. The modelled countries or zones are Northern Africa and the Middle-East, Argentina, Brazil, Canada, China, the United States, Central and Eastern European countries (Bulgaria, Hungary, Poland, the Czech Republic, Romania, Slovakia), Ukraine and the European Union (this area representation is based on the econometric modelling of Germany, Spain, France, Italy, the United Kingdom and an area made of the rest of the European Union).

Each domestic market is characterized by an arable crop production, a disaggregated consumption per origin (human demand, animal demand and stocks), trade (imports and exports) and prices (market prices are differentiated from production prices). For each area or country, the behavioural relationships linked to these variables are estimated from the annual data from Eurostat for the European Union and from the USDA for the other countries. For some zones, due to data availability problems, only some of the variables were modelled (for the "Northern-African, Middle-Eastern" area and for Ukraine, only net trade was modelled). For the CEEC, only the supply module was assessed in a different way for each of the 6 countries, with the other modules aggregating the 6 countries. To the behavioural relationships we add the accounting equation describing market equilibrium to complete each regional model, that is to say the equality between resources and uses.

Next, each zone or country model was linked by integration of an equation representing world market performance. For each crop studied, the world market balances our at a single world price which then affects the various domestic markets.

Box 1 shows the various explaining factors of the model, the performance of each domestic market and the choice made to take support tools into account, in particular, the European Union systems.

Two simulations: a total decoupling scenario and a partial decoupling scenario

Two scenarios were implemented, differentiated by their conditions of application of (total or partial) decoupling.

The results of both simulations were compared with a reference scenario corresponding to the present situation that was assumed not to vary until 2009.

Box 2: Hypotheses used to determine the scenario of reference

The reference scenario provides projections of the main variables present on the market for 2000-2009. The implementation of this scenario requires hypotheses to be made on the exogenous variables of the model (macroeconomic variables, variables of agricultural policies, development of animal production, cereal and oleaginous-proteaginous area (COPC).
The assumptions used for the macro-economic variables (gross domestic product, population, exchange rate, general level of prices…) were those from the Food and Agricultural Policy Research Institute (FAPRI).
The variables for agricultural policies were at their 2002 level and were considered unchanged over the whole simulation period. For the European Union, basic aid was fixed at €63/t for cereals and oleaginous crops, at €72/t for proteaginous crops and at €53/t for rice. The intervention price was €10.31/t for cereals and €300/t for rice. The set-aside rate was also fixed at its 2000level.
Regarding Commercial policies (subventions for export, tariff quotas etc…), they were considered unchanged compared with 2000.
Regarding European Union enlargement, we assumed that the Union still consisted of 15 members during the simulation period.
The assumptions used for animal productions were those of the FAPRI. COPC growth was based on its historical development.

For the total decoupling scenario, we supposed that all Member States chose the option consisting in decoupling all single payments. Furthermore, we supposed that the latter had no direct effect on the volumes produced.

For partial decoupling we supposed that all the Member States maintained 25% of the single payment coupled under the form of aid per hectare, the credit balance being decoupled and without any direct effect on the volumes produced.

In each decoupling scenario, the main reform modifications that were introduced were the following: modulation of direct payments (3% drop in 2005, 4% in 2006 and 5% from 2007), a 50% drop in the monthly increments for cereals, the withdrawal of the rye intervention and a 50% drop in the rice intervention price. These various elements were integrated into the scenarios from 2005. Furthermore, the COPC area was considered in an exogenous way, meaning that its development was the same in the two decoupling scenarios as in the reference scenario.

Results

Soft wheat: the only cereal to take advantage of reform in the European Union

Table 1 presents the effects of both simulations on European Union arable crops.

The effects of the reform on the main supply of the main cereals (wheat, barley and maize) are relatively weak

compared with the impacts on rice and other cereals. Supplies of all the cereals (except for soft wheat) fall in both scenarios. Impacts are more or less high, depending on the products. Barley production drops very slightly (less than 1%), while maize drops by 5% or so. The "other cereals" aggregate (i.e. oat, rye, triticale and sorghum) suffers the biggest drop in production level (down 17%). Soft wheat is the only one to see its production increase by 2%.

Globally, the impacts of partial decoupling are less than those of total decoupling. Only, rice area and production drop more in the partial decoupling scenario. This result is understandable because in the case of rice, the aid granted to other crop producers have a higher impact than the direct aid and proper price.

Oleaginous cereals profit from reductions in cereal crops. The soya area is that which increases most (by up to 40%). However, it is important to note that the soya share remains very low compared with the COPC area in the European Union. As for cereals, the impacts of partial decoupling are less than those of partial decoupling.

A drop in European prices

The impacts of reform on the prices of the European Union are negative for all the crops in both scenarios, to an extent that varies according to crops (see table 2).

Guide prices drop by less than 1% for soft wheat and barley, by 1.1% for the domestic prices of maize and rye. Only the rice price varies greatly (55% fall). This result is due to the reform of June 2003 that cut the rice intervention price by half while for cereals the intervention price remains unchanged, the only modification being the reduction of the monthly increments by half.

An insignificant impact on world markets

The impacts of reform on world markets for soft wheat and maize (world prices and trade) are presented in table 3.
Impacts on world prices are rather weak, although a slight increase in world prices is observed in both decoupling scenarios.
We also implemented an alternative scenario using the partial decoupling scenario and the July 2002 proposals of a 5% fall in the cereal intervention price and not putting an end to the monthly increase. This scenario involves higher variations in world prices, in particular for soft wheat (0.3% increase). For maize, the variation in world price is almost the same as that in the partial decoupling scenario.

Do the United States take advantage of this reform?

The effects on global wheat and maize trade are insignificant.
Regarding European Union trade on world markets, variations in soft wheat are almost non existent. Maize exports drop on account of the fall in maize production. Maize imports correspond to the volume of the tariff quotas in the reference and decoupling scenarios.

The United States, as the main wheat and maize exporter, do not take advantage of the fall in European Union cereal supply. We have seen that the fall in European Union cereal supply is somewhat small, and wheat production does not drop (on the contrary, it increases by 2%.) World prices are only slightly affected by the reform. Consequently, United States exports increase very little. Wheat trade does not vary (variations of less than 0.15 and 0.20%).

Conclusion

Results suggest that the consequences of CAP reform on world arable crop markets are rather weak. The impacts of the total decoupling scenario are higher than those of the partial decoupling ones. A slight increase in world cereal prices was observed in both decoupling scenarios. However, these results are subject to two major assumptions: in the model, the oleaginous-proteaginous cereal area is considered in an exogenous way, and its development is not affected in the two simulation scenarios of the model. We also suppose that the single payment per farm has no effect on the decisions of production.

As regards the instrument used in the application, several extensions must be made: what is more, the improvement of the model geographic cover, the modelling effort could also be done on animal producers: The demand in animal feeding (a variable explained in the model) is linked to growth in animal production which is considered in the present version of WEMAC in an exogenous way.

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For further information

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Table 1: Variations in arable crop production in the European Union
(as a % compared to the reference scenario)

	2003	2004	2005	2006	2007	2008	2009
Production of cereals in the EU (1,000 tons)							
Soft wheat							
Reference	95,603	97,499	99,236	101,121	103,070	105,022	106,969
Partial decoupling	0	0	0	+1.90	+1.85	+1.81	+1.77
Total decoupling	0	0	0	+2.33	+2.24	+2.17	+2.10
Maize							
Reference	37,146	39,715	39,865	40,568	41,549	42,626	43,657
Partial decoupling	0	0	0	-3.35	-3.32	-3.27	-3.24
Total decoupling	0	0	0	-4.69	-4.58	-4.43	-4.30
Barley							
Reference	56,186	56,345	57,091	57,974	58,837	59,697	60,620
Partial decoupling	0	0	0	-0.59	-0.62	-0.64	-0.65
Total decoupling	0	0	0	-0.64	-0.67	-0.69	-0.71
Rice							
Reference	1,812	1,806	1,851	1,881	1,906	1,930	1,958
Partial decoupling	0	0	0	-6.89	-6.63	-6.36	-6.09
Total decoupling	0	0	0	-5.67	-5.50	-5.33	-5.15
Other cereals							
Reference	18,604	18,520	18,632	18,764	18,876	18,979	19,097
Partial decoupling	0	0	0	-12.95	-13.22	-13.53	-13.82
Total decoupling	0	0	0	-17.07	-17.21	-17.35	-17.46
Production of oilseeds in the EU (1,000 tons)							
Rapeseed							
Reference	11,944	12,314	12,934	13,473	14,006	14,525	15,057
Partial decoupling	0	0	0	+3.34	+3.21	+3.13	+3.07
Total decoupling	0	0	0	+4.36	+4.14	+3.98	+3.85
Soya							
Reference	1,666	1,685	1,751	1,813	1,868	1,924	1,982
Partial decoupling	0	0	0	+42.37	+41.82	+41.20	+40.53
Total decoupling	0	0	0	+56.20	+54.77	+53.13	+51.52
Sunflower							
Reference	3,536	3,694	3,816	3,947	4,079	4,219	4,359
Partial decoupling	0	0	0	+12.77	+12.51	+12.21	+11.87
Total decoupling	0	0	0	+17.14	+16.57	+15.91	+15.23

Table 2: Variations in prices in the European Union
(as a % compared to the reference scenario)

Trigger prices	2003	2004	2005	2006	2007	2008	2009
French soft wheat prices (€/ton)							
Reference	116.88	115.03	113.7	112.86	112.07	111.46	110.85
Partial decoupling	0	0	-0.37	-0.37	-0.37	-0.37	-0.37
Total decoupling	0	0	-0.37	-0.37	-0.37	-0.37	-0.37
French maize prices (€/ton)							
Reference	102.61	96.99	95.15	95.06	95.69	96.24	96.33
Partial decoupling	0	0	-1.14	-1.15	-1.10	-1.10	-1.09
Total decoupling	0	0	-1.14	-1.15	-1.10	-1.10	-1.09
French barley prices (€/ton)							
Reference	101.7	99.63	98.93	98.41	98.07	98.21	98.21
Partial decoupling	0	0	-0.85	-0.85	-0.86	-0.86	-0.86
Total decoupling	0	0	-0.85	-0.85	-0.86	-0.86	-0.86
Italian rice prices (€/ton)							
Reference	261.39	261.54	260.37	259.60	259.94	261.49	263.16
Partial decoupling	0	0	-55.68	-55.84	-55.77	-55.44	-55.09
Total decoupling	0	0	-55.68	-55.84	-55.77	-55.44	-55.09
German rye prices (€/ton)							
Reference	94.35	92.42	91.77	91.29	90.97	91.10	91.10
Partial decoupling	0	0	-1.10	-1.10	-1.11	-1.11	-1.11
Total decoupling	0	0	-1.10	-1.10	-1.11	-1.11	-1.11

Table 3: Variations in world soft wheat and maize prices and trade in the European Union and USA
(as a % compared to the reference scenario)

		2003	2004	2005	2006	2007	2008	2009
Soft wheat								
World price (Soft Red Winter[1]) USD/ton								
Reference		126.18	121.73	120.65	124.01	125.76	128.03	129.75
Partial decoupling		0	0	-0.06	+0.06	+0.08	+0.11	+0.11
Total decoupling		0	0	-0.06	-0.01	+0.04	+0.06	+0.06
Exports (1000 tons)								
Reference	UE	18,133	17,168	16,705	16,724	16,769	16,993	17,119
	USA	26,929	25,371	25,882	27,360	28,881	30,083	30,650
Partial decoupling	UE	0	0	-0.03	+0.03	+0.04	+0.06	+0.06
	USA	0	0	-0.02	+0.01	+0.04	+0.03	+0.03
Total decoupling	UE	0	0	-0.03	-0.01	+0.02	+0.03	+0.03
	USA	0	0	-0.02	-0.01	+0.02	+0.01	+0.01
Maize								
World price (USD/ton)								
Reference		110.94	101.87	100.97	103.83	107.45	109.45	109.75
Partial decoupling		0	0	-0.01	-0.02	+0.09	+0.09	+0.10
Total decoupling		0	0	-0.01	-0.02	+0.11	+0.11	+0.11
Exports (1000 tons)								
Reference	UE	2,030	1,993	2,107	2,119	2,178	2,224	2,278
	USA	44,570	41,779	42,400	44,230	45,615	46,227	46,836
Partial decoupling	UE	0	0	+0.23	+0.23	-2.90	-2.89	-2.85
	USA	0	0	-0.01	-0.01	+0.16	+0.15	+0.14
Total decoupling	UE	0	0	+0.23	+0.23	-4.16	-4.08	-3.95
	USA	0	0	-0.01	-0.02	+0.22	+0.20	+0.19

1 wheat quality with a middle protein content (10-11%)