DID THE 2000 AND 2003 COMMON AGRICULTURAL POLICY REFORMS ACHIEVE THE OBJECTIVE OF REDUCING PRICES OF CEREALS AND MILK?

Analysis based on Spain, France, Germany, Italy and United Kingdom

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Abstract *

The aim of this paper is to analyse whether the Agenda 2000 and the Luxembourg 2003 reforms have achieved the objective of reducing the prices of cereals and milk, which are the two products that were the most heavily reformed during these two processes of amendments. The study will be based on Germany, Spain, France, Italy and United Kingdom.

The paper is organized as follows. Section I provides an overview of the origins and reforms of the Common Agricultural Policy inside the context of the process of the European integration. Section II explains the specific reforms that were introduced in the cereal and dairy sector during the 2000 and 2003 reforms. Based on the previous section, Section III analyses if during the years in which the reforms were implemented, there was any level shift on the prices of cereals and milk. Section IV concludes. In the Appendix, the data used is outlined and the procedure and the difficulties that appeared during the elaboration of the data set are explained.

Keywords: Agenda 2000 and Luxembourg 2003 reforms, Cereals, Milk and Prices.

I.   <u>Introduction</u>

The CAP is the first common policy adopted by the European Union (EU) [1] under the sign of the Treaty of Rome in 1957 and its roots come from 1950s Western Europe, whose societies had been damaged by years of war, and where agriculture had been destroyed and food supplies could not be guaranteed. It offered subsidies and systems ensuring high prices to farmers, providing incentives for them to produce more. It was based on three main principles: common market, community preference and financial solidarity. Since its implementation, the CAP has evolved in response to domestic pressures, including changes in agricultural policy priorities after the enlargement of the EU, efficiency improvements and budget constraints, and to international pressures, especially from the World Trade Organization, to reduce trade distortions.

These new challenges obliged the Union to carry out several reform processes based on a gradual re-instrumentation of support from market intervention to direct payments to producers. In 1992, the MacSharry reform marked the beginning of a series of reforms that led to a reduction in intervention prices and introduced compensatory payments per hectare of cereals, and increased the rate of payments per head of animal. The reforms of 1992 were reinforced by the Agenda 2000 reform with further cuts in intervention prices compensated by higher payments. In addition, payment rates were equalised for all cereal, oilseed and protein crops. The 2003 reform represented another major step with the introduction of single fixed payments with entitlements based on historical payment references, which do not require production of any commodity, to replace part or all of previous area and headage payments. Since 2003, additional commodity sectors have been reformed[2] resulting in a higher share of direct payments to producers delivered as a single payment with no requirement to produce. The Health Check of the CAP in 2008 resulted in the implementation of further CAP changes at the beginning of 2009, consolidating previous measures.

This stream of reforms has been characterised by a consistent and gradual reduction in domestic market intervention and a loosening of the link between the provision of direct payments and current production, the so-called process of decoupling. Depending on their timing, CAP reform discussions take place within a given long-term budget called "financial perspectives" or in parallel with discussions about future ones. Current "financial perspectives" run from 2007 to 2013, while the next one starting in 2014 is under negotiation.

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[1] At the time, it was the European Community. The European Union was created in 1992 with the signing of the Treaty of Maastricht.

[2] Tobacco, olive oil, cotton and hops in 2004, sugar in 2006, fruits and vegetables in 2007, and wine in 2008.

II.   Agenda 2000 and Luxembourg 2003 reforms in the cereals and milk sector

The empirical analysis will be focused on the Agenda 2000 and Luxembourg 2003 reforms in two areas significantly changed after their implementation: the cereal and the milk sector. Before starting with it, it is necessary to first point out the specific years in which the measures of the 2000 and 2003 reforms were implemented in order to know exactly how to proceed with the time series analysis.

The cereals sector

Since the early 1960s the European Union has provided high levels of support to cereal producers under the Common Agricultural Policies. In July 2000 the European Union started implementing a package of reform measures for the cereals and oilseeds sectors as part of a broader reform package known as "Agenda 2000", which divided the CAP into two Pillars: production support and rural development. As part of the second Pillar of the CAP, the Rural Development Regulation (RDR) was included for the first time, bringing together the accompanying measures of the MacSharry reform of 1992 plus compensatory allowances as a measure for less favoured areas, as well as rural development measures previously financed by the Guidance section of the European Agricultural Guarantee and Guidance Fund (EAGGF). The commodity specific components of the Agenda 2000 package also represent reforms to broader areas such as structural policy, the European Union's financial framework and measures aimed at the accession of central and eastern European countries to the European Union.

The first main measure of the reforms in July 2000, involved a 15 per cent cut in the intervention price for cereals in two equal steps over 2000-01 and 2001-02 and it was brought down from EUR 119.19/t to EUR 101.31/t. Besides, an increase in compensation payments, now called arable payments was included. The arable payment was based on the area actually planted to arable crops and the fixed regional yields that were established under the 1992 reforms. However, unlike the 1992 reforms where the reduction in support prices was fully compensated, under Agenda 2000 the increase in direct payments was about half of the price reduction. The direct payments[3] for cereals fixed on a per hectare basis (at the time EUR 54/t multiplied by the historical reference yield) were increased in two annual steps and amounted in year 2001/2002 to EUR 63/t. It was expected that

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[3] The payments were made from November 16th to January 31st.

internal market prices would stay above the support price level and that farmers would react to the changes by adopting cost-saving measures while input costs were bound to fall.

In addition to this, the monthly increments system introducing seasonal price corrections was maintained at the previous level i.e. EUR 1/t per month and compulsory and voluntary set-aside[4] were both maintained. For compulsory set-aside, the basic set-aside implemented was 10 per cent, compared with a base rate of 17.5 per cent under the 1992 reforms. The set-aside rate to be applied was determined on the basis of market conditions. Compensation for both compulsory and voluntary set-aside was 63 a tonne, based on the area set-aside and the fixed regional yield.

Three years later, the Council of Agricultural Ministers of the European Union reached an agreement, in Luxembourg on 26 June 2003, on a reform of the Common Agricultural Policy. The most important feature was the introduction of the Single Payment Scheme (SPS), where payments were based on fixed 2000-2002 entitlements from 2005 or 2006 depending on the country to replace part or all of previous area and headage payments. Besides, cross-compliance[5] was introduced as a condition for receiving full payments, as well as a modulation to transfer funds from Pillar 1 to Pillar 2 of the CAP, but flexibility was given to countries as to the implementation of SPS.

Regarding the cereals sector, the compensation payments that became part of the SPS in 2005 were maintained at EUR 63/t and the intervention prices unchanged as well.[6] The seasonal price corrections introduced by the monthly increments system were reduced by 50 per cent.

Table 1: Prices and Payments for Cereals in EUR/tonne of cereal reference yield				
	1999	2000	2001	2002/2006
Intervention Price	119.19	110.25	101.31	101.31
Compensation payments	54.34	58.67	63.00	63.00

Source: Own elaboration with the information from the *Regulation nº 1784/2003* of the European Council

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[4] Set-aside is a scheme designed to reduce the production of arable crops. Farmers in the scheme agree to set-aside, that is to stop using any kind of agricultural production, a percentage of the land they have been using for growing agricultural crops. In return they receive annual compensation payments. The set-aside scheme was completely abolished through the CAP Health Check in 2008.

[5] Cross-compliance is a mechanism that links direct payments to compliance by farmers with basic standards concerning the environment, food safety, animal and plant health and animal welfare, as well as the requirement of maintaining land in good agricultural and environmental condition.

[6] See Table 1 with the evolution of the intervention prices and compensation payments from 2000 until 2006.

The milk sector

Milk production is the most important agricultural activity in almost all EU countries and accounts, in the EU as a whole, for around 18% of the total value of agricultural production. The EU is the biggest exporter of dairy products in the world even if its market share has been declining during recent years.

The changes introduced under Agenda 2000 essentially involved a progressive reduction in institutional prices from 2005 onwards, partly offset by direct payments to producers. One of the key elements of the dairy reform was that the intervention prices for butter and skimmed-milk powder were cut by 15 per cent in three equal steps as from the 2005/06 milk year in an attempt to encourage consumption on the internal market and make the Union's milk products more competitive in international markets. For milk (3.7 per cent fat content), price support continued to be based on a target price.

To limit the impact of the planned reduction in intervention prices and thus help stabilize agricultural income, direct payments to producers were financed by the Community with effect from the 2005/06 marketing year. They consisted initially of two elements: dairy premiums paid equally to all milk producers; and additional payments paid to milk producers according to criteria decided upon by the Member States. The dairy premium was granted per calendar year, per holding and per tonne of individual reference quantity. Additional payments could be granted by the Member States in their territory for up to the global amounts set per country on the basis of their share of total Community production. The additional payments comprised "top-up" premiums (premium supplements), which could be granted only as a supplement per dairy premium amount per tonne and area payments, granted per hectare of permanent pasture[7].

The milk quota[8] regime was first introduced in 1984 and was extended over the years until the year 2000. Under the Agenda reform, an extension was once again agreed, so that it remained in force until 2007/2008. Italy, Greece, Spain Ireland and Northern Ireland received a specific increase in quota in two unequal steps in the years 2000/2001 and 2001/2002[9]. In Member States (besides Italy,

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[7] See Table 2 for the evolution of the direct payments to producers from 2005 onwards.

[8] Every member state has a national production quota which it distributes to farmers. Whenever a member state exceeds its quota, it has to pay a penalty (called 'super levy') to the EU. This national penalty is in turn financed by penalties imposed on farmers who have exceeded their individual quotas.

[9] 64% of the additional quota will be allocated in 2000/2001 and 36% in the subsequent year.

Greece, Spain, Ireland and Northern Ireland) quotas were increased by 1.5% in three steps over three years in parallel with the price reductions starting in 2005/06 to 2007/08.

Table 2: Direct payments to producers			
Calendar year[10]	2005	2006	2007
Dairy premium UR/tonne[11]	5.75	11.49	17.24
Total maximum premium + "top-up" premium: UR/tonne	13.9	27.8	41.7
Area payments: per ha permanent pasture[12]	EUR 350 maximum for 2005 and following years		

Source: Own elaboration with the information from the report *Milk and milk products*, *EC (2006)*

During the Luxembourg reform of 2003, several of the measures agreed during the Agenda 2000 were modified. A larger reduction of 25 per cent in the intervention prices of butter of and of 15 per cent in the intervention prices of skimmed-milk powder was agreed from the campaign 2007/2008 onwards[13]. Regarding the direct payments, it was optional to include them in the Single Farm Payment from 2005 but compulsory from 2007 onwards. Finally, the milk quotas were extended until 2015 and the increases in milk quotas scheduled for 2005 were deferred until 2006.

Table 3: Intervention/Target prices of Milk and its dairy products (EUR/100kg)				
Milk year	2000/2005	2005/2006	2006/2007	2007/…
Butter: intervention price	328.20	311.79	295.38	246.39
Skimmed-milk powder: intervention price	205.52	195.24	184.97	174.69
Milk (3.7% fat content, delivered to dairy): target price	30.98	29.23	27.47	25.72

Source: Own elaboration with the information from the report *Milk and milk products*, *EC (2006)*

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[10] Direct payments are generally made to producers between 16 October of the calendar year in question and 30 June of the following year.

[11] Per tonne of individual reference quantity. If at 31 March the sum of the individual quantities exceeds the sum of the total quantities laid down in a Member State, the latter is to take the necessary measures accordingly to reduce the total individual reference quantities eligible for the premium in its territory.

[12] This is the area available to the producer during the year in question.

[13] See Table 3 with the evolution of the intervention prices from the campaign 2000 on.

III.   <u>Empirical Framework</u>

The aim of the empirical analysis is to check if the 2000 and 2003 CAP reforms achieved the objective of reducing prices of cereals and milk.

For this, a dataset containing time series data about price indexes of cereals and milk for Spain, France, Germany, Italy and United Kingdom, for the period between 1973 and 2011 will be used[14]. The estimations will be carried out with the Program TSW[15], a Windows application based on programs TRAMO and SEATS and developed at the Bank of Spain by Gianluca Caporello and Agustín Maravall. At present it is used by many national statistical offices, central banks, international institutions, and data-producing agencies in general, as well as at universities, research centers or private companies.

For the analysis, it will be only used TRAMO ("Time Series Regression with ARIMA Noise, Missing Observations and Outliers"), a program for estimation and forecasting of regression models with possible non-stationary (ARIMA) errors and any sequence of missing values. Fully automatic model identification and outlier correction procedures are available.

Time series observations are often influenced by interruptive events, technically known as outliers, which are observations or records which appear to be inconsistent with the rest of the group of the sample. TRAMO allows the identification of the following three types of outliers:

- Additive Outlier (AO): It affects a single observation. After this disturbance, the series returns to its normal path as if nothing has happened.

- Transitory Change Outlier (TC): It is a spike that takes a few periods to disappear exponentially. The impact of a TC is not permanent, however it decays exponentially.

- Level Shift Outlier (LS): It is like a step function. For a stationary process, a level shift implies a change in the mean of the process after a point and consequently the process is transformed into a non-stationary one.

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[14] See Appendix A with the methodology and the detailed explanation of the construction of the data sets as well as the TRAMO commands.

[15] Program TSW can be downloaded for free under the following link of the Bank of Spain:
   http://www.bde.es/webbde/es/secciones/servicio/software/econom.html

Thus, in order to check if the 2000 and 2003 CAP reforms achieved the objective of reducing prices of cereals and milk, it is needed to identify if there is any level shift in any of years in which these two reforms were implemented. For this, it will be constructed a single model for each product in each of the five countries of the analysis. In the models, standard errors are in parenthesis and *, ** and *** mean significantly different from zero at 10, 5 and 1%, respectively.

Outlier identification for the price index of cereals

In the case of cereals, the implementation of the Agenda 2000 and the Luxembourg 2003 reforms took place between 2001 and 2006. Thus, six dummy variables are introduced for the years between 2001 and 2006 in order to check if there was any level shift in the prices of cereals during that period.

$$D_t \begin{cases} 1, & if\ t = t \\ 0, & if\ t \neq t \end{cases}$$

1. Model : Germany (DE)   (1,0,0)

$$y_t = 0.71 * y_{t-1} - 76.89 * D_{2005} + \varepsilon_t,\ (1)$$
$$(0.16) \qquad\qquad (31.69)^{**}$$

where D_{2005} is a Level Shift (LS).

Normality Test = 0.9756   (CHI-SQUARED(2))

2. Model: Spain (ES)   (1,1,0)

$$y_t = 65.51 - 0.95 * y_{t-1} - 0.49 * \varepsilon_{t-1} + 38.87 * D_{1995} - 18.34 * D_{2006} + \varepsilon_t,\ (2)$$
$$(12.82)^{***}\ (0.56)^{***} \qquad (0.17)^{***} \qquad (8.90)^{***} \qquad\quad (8.49)^{**}$$

where D_{1995} is an Additive Outlier and D_{2006} a Level Shift (LS).

Normality Test = 2.522   (CHI-SQUARED(2))

3. Model: France (FR)   (1,0,0)

$$y_t = 102.44 - 0.82 * y_{t-1} + 20.12 * D_{2003} - 21.87 * D_{2004} + 38.02 * D_{2007} + \varepsilon_t, \quad (3)$$

$\quad$ (10.94)*** $\quad$ (0.91)*** $\qquad$ (8.92)** $\qquad\qquad$ (8.97)** $\qquad\qquad$ (7.08)***

where D_{2003} and D_{2004} are Level Shifts and D_{2007} is an Additive Outlier.

Normality Test = 3.401   (CHI-SQUARED(2))

4. Model: Italy (IT)   (0,1,1)

$$\Delta y_t = 0.55 * \varepsilon_{t-1} - 52.42 * D_{2005} + \varepsilon_t, \quad (4)$$

$\qquad$ (0.13)*** $\qquad$ (11.45)***

where D_{2005} is a Level Shift.

Normality Test = 0.5869   (CHI-SQUARED(2))

5. Model: United Kingdom (UK)   (1,0,1)

$$\Delta y_t = -0.13 * y_{t-1} - 68.80 * D_{2005} - 48.58 * D_{2009} + \varepsilon_t, \quad (5)$$

$\qquad$ (0.25) $\qquad\qquad$ (18.35)*** $\qquad\qquad$ (16.45)***

where D_{2005} is a Level Shift and D_{2009} is a Transitory Change.

Normality Test = 1.492   (CHI-SQUARED(2))

The main results that are obtained are the following: Germany had a level shift in 2005, Spain in 2006, France in 2003 and 2004 and Italy and United Kingdom in 2005. In view of these results, we can observe that although the effect of the reforms was not at the same time in every country due probably to the flexibility in their implementation, in each of the countries there is some level shift during that period of time. In Graph 1, it is shown that from 2001 until 2006, the prices declined.

Therefore, we can state that we have found some evidence about the fact that the reforms had an effect on curving prices of cereals.

Graph 1: Price indexes of cereals for the period between 1973-2011
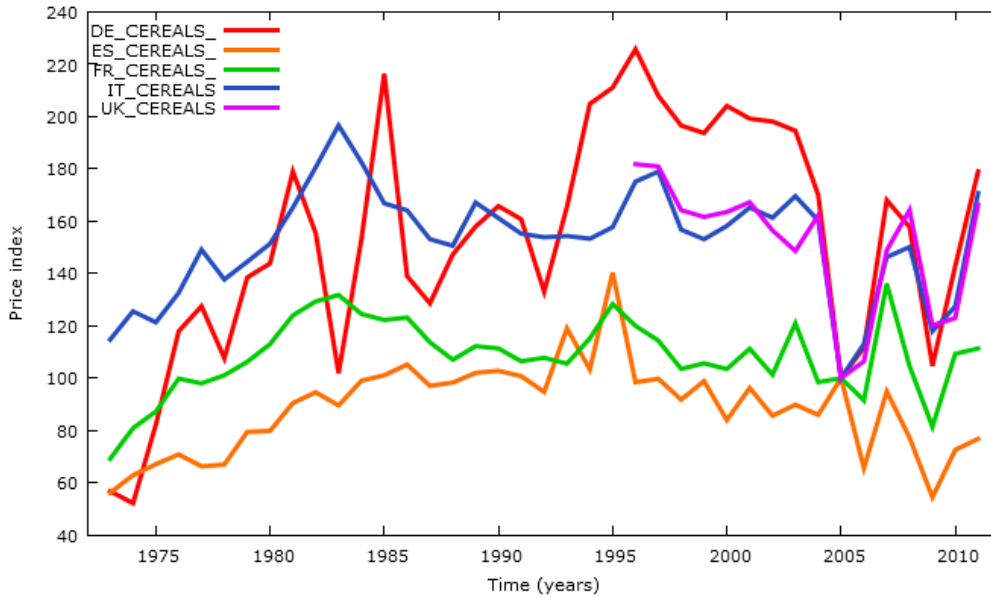
Source: Own elaboration with Data Set 3.

Outlier identification for the price index of milk

Regarding the milk sector, the implementation of the Agenda 2000 and the Luxembourg 2003 reforms was carried out between 2005 and 2009. Therefore, five dummy variables are introduced for the years between 2005 and 2009 in order to check once again if there was any level shift in the prices of milk during that period.

$$D_t \begin{cases} 1, & if\ t = t \\ 0, & if\ t \neq t \end{cases}$$

6. Model : Germany (DE)   (1,0,1)

$$\Delta y_t = 2.57 - 0.37 * y_{t-1} + 8.43 * D_{2001} - 18.01 * D_{2007} - 41.20 * D_{2009} + \varepsilon_t, \quad (6)$$
$$\quad (1.39)^* \quad (0.15)^{**} \quad\quad (3.00)^{***} \quad\quad\quad (4.86)^{***} \quad\quad\quad (4.86)^{***}$$

$where\ D_{2001}\ is\ an\ Additive\ Outlier\ and\ D_{2007}\ and\ D_{2009}\ are\ Level\ Shifts.$

Normality Test = 2.156   (CHI-SQUARED(2))

7. Model: Spain (ES)   (0,1,1)

$$\Delta y_t = 1.45 - 0.50 * \varepsilon_{t-1} + 18.07 * D_{1989} + 14.36 * D_{2005} - 18.24 * D_{2006}$$

$$(0.37)^{***} \ (0.14)^{***} \qquad (3.69)^{***} \qquad\qquad (4.12)^{***} \qquad\qquad (4.55)^{***}$$

$$+13.82 * D_{2007} - 19.00 * D_{2009} + \varepsilon_t, \quad (7)$$

$$(4.19)^{***} \qquad\qquad (3.73)^{***}$$

where D_{1989} is a Transitory Change and $D_{2005}, D_{2006}, D_{2007}$ and D_{2009} are Level Shifts.

Normality Test = 1.622   (CHI-SQUARED(2))

8. Model: France (FR)   (2,0,1)

$$\Delta y_t = 2.22 - 0.15 * y_{t-1} + 0.30 * y_{t-2} + 0.65 * \varepsilon_{t-1} - 13.47 * D_{2006}$$

$$(0.50)^{***} (0.22) \qquad\quad (0.25) \qquad\quad (0.21)^{***} \qquad (2.28)^{***}$$

$$+13.40 * D_{2008} - 19.94 * D_{2009} + \varepsilon_t, \quad (8)$$

$$(2.82)^{***} \qquad\qquad (2.65)^{***}$$

where D_{2006}, D_{2008} and D_{2009} are Level Shifts.

Normality Test = 0.1346E-01   (CHI-SQUARED(2))

9. Model: Italy (IT)   (0,1,1)

$$\Delta y_t = 2.09 - 0.40 * \varepsilon_{t-1} - 9.00 * D_{1995} + 10.00 * D_{2008} - 12.98 * D_{2009} + \varepsilon_t, \quad (9)$$

$$(1.04)^{**} \ (0.15)^{***} \qquad (2.50)^{**} \qquad\quad (4.61)^{**} \qquad\qquad (4.62)^{***}$$

where D_{1995} is an Additive Outlier and D_{2008} and D_{2009} are Level Shifts.

Normality Test = 0.5362E-01   (CHI-SQUARED(2))

10. <u>Model: United Kingdom (UK)   (1,0,1)</u>

$$\Delta y_t = 2.68 - 0.26 * y_{t-1} + 15.61 * D_{2001} - 11.72 * D_{2007} - 27.88 * D_{2009} + \varepsilon_t, \quad (10)$$

$$(1.34)^{**} \quad (0.16)^{*} \qquad (3.74)^{***} \qquad (5.94)^{**} \qquad (5.94)^{***}$$

$where \ D_{2001} \ is \ an \ Additive \ Outlier \ and \ D_{2007} \ and \ D_{2009} \ are \ Level \ Shifts.$

Normality Test =   1.605   (CHI-SQUARED(2))

The main results that are obtained are the following: Germany had a level shift in 2007 and 2009, Spain in 2005, 2006, 2007 and 2009, France in 2006, 2008 and 2009, Italy in 2008 and 2009 and United Kingdom in 2007 and 2009. In this case, it can also be observed that in each country there is some level shift during that period. Additionally, the five countries experienced a level shift in the prices of milk in 2009, so that in the case of the prices of milk we also have evidence that the reforms had an important effect on curving prices of milk and in this case there was less flexibility in their implementation as it can be seen in Graph 2.

Graph 2: Price indexes of milk for the period between 1973-2011
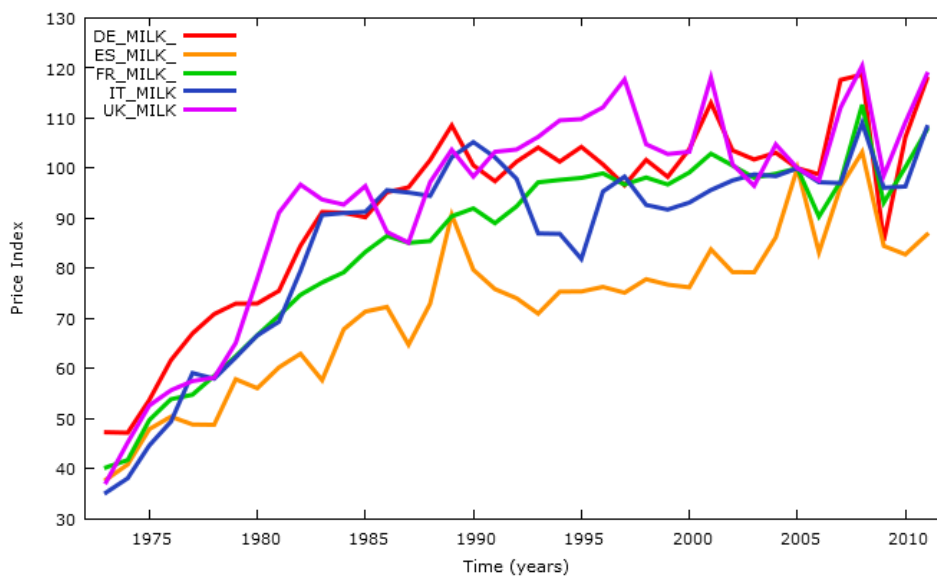
Source: Own elaboration with Data Set 3.

13

IV. <u>Conclusion</u>

This paper has made an evaluation of the price effects of the Agenda 2000 and the Luxembourg 2003 Common Agricultural Policy reforms. The main result is that both seemed to have had an effect on curving the prices of cereals and milk in the five analyzed countries: Germany, Spain, France, Italy and United Kingdom. This has been proved empirically through an econometric analysis of outlier identification with the statistical program TRAMO. The outliers were not found in exactly the same year for each country, what might probably mean that there was some flexibility in the implementation of the measures depending on the country.

It cannot be forgotten that, apart from the reforms, there might be other additional factors that could have affected the prices of cereals and milk during that period of time. One clear example is the significant global rise in food prices in 2008 that caused an increase from 167 up to 238 in the cereals price index[16] and from 220 up to 240 in the dairy price index[17] of the Food and Agricultural Organization of the United Nations between 2007 and 2008. This sudden price rise reversed the declining tendency caused by the analyzed reforms in the prices of milk and cereals in the EU.

This analysis could also be carried out for any other evaluation of a policy regarding changes in prices and thus, for all the other CAP reforms. This would give more evidence to the fact that the CAP reforms are being effective in reversing the trend of agricultural price products to increase. Besides, it would also contribute to the accomplishment of one new challenge of the CAP based on meeting international undertakings and being able to take advantage of the expansion of world markets, avoiding the risk that surpluses will appear again, creating intolerable budget costs and leading to a loss of market share within the Community and on the world level.

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[16] This index is compiled using the grains and rice Price indexes weighted by their average trade share for 2002-2004. The Grains Price index consists of International Grains Council (IGC) wheat Price index, itself average of 9 different wheat Price quotations, and 1 maize export quotation; after expressing the maize Price into its index form and converting the base of the IGC index to 2002-2004. The Rice Price Index consists of 3 components containing average prices of 16 rice quotations: the components are Indica, Japonica and Aromatic rice varieties and the weights for combining the three components are assumed (fixed) trade shares of the three varieties.

[17] This index consists of butter, Skimmed Milk Powder, Whole Milk Powder, cheese, casein Price quotations; the average is weighted by world average export trade shares for 2002-2004.

References

- EUROPEAN COMMISSION (2006), *The Cap Reform: Milk and milk products*, August, Brussels, Belgium.

- EUROPEAN COUNCIL (1999), *Reglamento No 1255/1999 por el que se establece la organización común de mercados en el sector de la leche y de los productos lácteos*, May, Brussels, Belgium.

- EUROPEAN COUNCIL (2003), *Reglamento No 1784/2003 por el que se establece la organización común de mercados en el sector de los cereales*, September, Brussels, Belgium.

- FABIOSA, BEGHIN, DONG, EL OBEID, FULLER, MATTHEY, TOKGÖZ AND WAILES (2005), *The Impact of The European Enlargement and CAP Reforms On Agricultural Markets. Much Ado about Nothing? Working Paper 05-WP 382*, Ames, United States.

- RAÚL COMPÉS LÓPEZ AND JOSÉ MARÍA GARCÍA ÁLVAREZ-COQUE (2009), *La reforma de la PAC y la agricultura española: alternativas y oportunidades para España, Documento de Trabajo 40/200*, Fundación Alternativas, Madrid, Spain.

- MAAMA (2003), *Boletín semanal de información internacional agroalimentaria y pesquera Documento Anejo Especial, Reforma de la PAC*, March, Madrid, Spain.

- EUROPEAN COUNCIL (2003), *Reglamento No 1788/2003 por el que se establece una tasa en el sector de la leche y de los productos lácteos*, September, Brussels, Belgium.

- EUROPEAN COMMISSION (2006), *Milk and milk products in the European Union*, August, Brussels, Belgium.

- KEANE AND O CONNOR (2009), *Price Volatility in the EU Dairy Industry: Causes, Consequences and Coping Mechanisms*, October, Cork, United Kingdom.

- EUROPEAN COMMISSION (2003), *CAP reform: A long-term perspective for sustainable agriculture*, March, Brussels, Belgium.

- OECD (2004), *Analysis of the 2003 CAP Reform*, Paris, France.

- ANDREWS AND NELSON (2001), *Agenda 2000: The European's Union reform package for grains, Australian Commodities, vol. 8 No 2*, June, Australia

- OECD (2011), Evaluation of Agricultural Policy Reforms in the European Union, Paris, France.

- JÚDEZ, DE ANDRÉS, IBÁÑEZ, DE MIGUEL, MIGUEL AND URZAINQUI (2008), Impact of the CAP reform on the Spanish agricultural sector, November, Viterbo, Italy.

Appendix A

A.1. Methodology (Construction of the data sets)

The most difficult task during the writing of this paper was the construction of the data sets that I elaborated together with Laura Castillo Martínez. After several months of research, we could finally obtain the data with help from the Statistical Office of the European Communities (Eurostat).

They provided us two datasets containing:
- annual constant and current prices with production value at basic price[18] of 24 agricultural products of 15 EU countries for the period between 1995 and 2006, with 1995 as base year, and
- annual constant and current prices with production value at basic price of 24 agricultural products of 15 EU countries for the period between 2005 and 2011, with 2005 as base year.

Although the most suitable dataset would have been one with monthly observations, for the period between 1973 and 2011, only annual data was available.

The 24 products included in the dataset are the following: Cattle, Sheep and goats, Poultry, Pigs, Equines, Other animals, Milk, Eggs, Olive oil, Citrus fruits, Fresh fruit, Dessert grapes, Table olives, Vegetables and Horticultural products, Tropical fruit, Other grapes, Other olives, Wine, Cereals (including seeds), Industrial crops, Seeds, Potatoes (including seeds), Vegetable materials used primarily for planting and Other crop products: others.

The 15 EU countries are the following: Austria (AT), Belgium (BE), Germany (DE), Denmark (DK), Spain (ES), Finland (FI), France (FR), Greece (GR), Ireland (IE), Italy (IT), Luxembourg (LU), Netherlands (NL), Portugal (PT), Sweden (SE) and United Kingdom (UK).

Once we checked that all the series were correct, we did the necessary calculations for computing the price indexes for each year and product. Current prices are those indicated at a given moment in time, and said to be in nominal value, whereas constant prices are in real value, that is, corrected for

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[18] The fact that the values are at basic price means that all the values are net of taxes and subsidies.

the increase in prices in relation to a baseline or reference datum. Thus, we could construct as a measure of the level of prices the following price index, similar to the Paasche price index[19]:

$$PI_t = \frac{Current\ price_t}{Constant\ price_t} * 100\ , \qquad where\ t = year$$

Using this formula, we computed the price indexes for all the years and products from the two datasets. Afterwards, in order to have one single series of price indexes with the same base year for the whole period between 1973 and 2011, we combined the two series of price indexes and what we obtained was one series with 39 annual observations for each product between 1973 and 2011, with 2005 as base year. This is the one that has been used during the empirical analysis for analyzing the effects on prices of cereals and milk during the Agenda 2000 and Luxembourg 2003 reforms. In order to check that the calculations for obtaining the price indexes were correct, we computed the variation rates for all the price indexes from 1973 to 2011 and graphed them. In some products, for which the lasts observations were missing, we computed the forecasts with TRAMO.

Together with the paper, I have delivered a CD with four excel files containing the calculations carried out in order to obtain the previous series necessary for the time series analysis:

- *Data Set 1*: Current and Constant prices and Price Indexes for the period between 1973 and 2006 with 1995 as base year.

- *Data Set 2*: Current and Constant prices and Price Indexes for the period between 1995 and 2011 with 2005 as base year.

- *Data Set 3*: Price Indexes for the period between 1973 and 2011, including the already mentioned forecasts.

- *Data Set 4*: Variation rates of the Price Indexes of *Data Set 3* and graphs.

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[19] A Paasche price index defined as a fixed weight, or fixed basket, index which uses the basket of goods and services of the current period. The current period serves as the weight reference period and the base period as the price reference period. It is identical with a weighted harmonic average of the current to base period price relatives using the value shares of the current period as weights.

A.2. TRAMO Commands

This part of the Appendix summarizes the options selected in the TRAMO program when estimating corresponding models:

- For the automatic model:

    Automatic procedure: RSA=3

    Other: IATIP=1, AIO=1

- For the manual model:

    Automatic procedure: RSA=0

    Arima Model: P=#, Q=#, D=#

    Other: IATIP=1, AIO1=1, IREG=1

    Then, IUSER=1, NSER=1, ILONG=length of series, Regression series=number of observations outlier is to be set and type of outlier (=LS).