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Effectiveness of the CAP in terms of its objectives

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**Poster paper prepared for presentation at the EAAE 2014 Congress
'Agri-Food and Rural Innovations for Healthier Societies'**

August 26 to 29, 2014
Ljubljana, Slovenia

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Abstract

The objective of this study is to empirically analyse the effectiveness of agricultural policies, given the general economic and structural conditions under which the policies operate. The effectiveness of policies is measured in terms of their impacts on the stated policy objectives. The analysis is carried out at the EU15 level and the time period analysed ranges from 1975 to 2007. The analysis suggests that structural economic development has to some extent outpaced the effects of agricultural policies. Structural and economic factors have developed at a significantly faster pace compared to agricultural policies. However, the implemented policy reforms in the EU have improved the policy effectiveness.

Keywords: *policy objectives, policy instruments, common agricultural policy*

1. Introduction

This study analyses the effectiveness of the Common Agricultural Policy of the European Union. Effectiveness is defined as the ability of policies and policy reforms to contribute to the development of the stated policy objectives. A motivation for the study rise from the fact that there is a lack of empirical research on the effects of policy instruments on the stated policy objectives. In addition, most of the analyses conducted have focused on the policy objective to secure farmers' incomes and, thus, on the efficiency of income redistribution (Alston and James, 2002; Bullock et al., 1999). This study aims to bring added value to the economic policy analysis of the CAP by extending the empirical policy analysis to cover the contribution of policies to the actual development of the stated policy objectives.

The setting of the analysis is based on the traditional version of Tinbergen's theory of economic policy (Tinbergen 1967), which starts out by classifying the variables of an econometric model into four groups: (a) policy target variables; (b) policy instruments; (c) data or non-controllable variables; and (d) non-target or irrelevant variables (Hughes-Hallett 1989, 195). In this study, the classification is modified to include policy target variables, exogenous variables not controllable by the policy-makers, and policy variables.

The data for the analysis in this study are obtained from several large databases. From the original data sources, a panel for EU15 countries is compiled following the enlargement of the European Union during the research period from 1975 to 2007.

2. Method

While the functional form and model variables for the analysis in this study cannot be drawn directly from a theoretical basis, the analysis starts with a single equation linear model in the form of

$$Y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_K x_K + u, \text{ or} \quad (1)$$

$$Y = \alpha_0 + \sum_j \alpha_j X_{jit} + u_{it}, \quad (2)$$

where y is a policy target variable, x_i the vector of j explanatory variables, α_j the coefficients to be estimated, α_0 a constant, and u a random error term. The subscripts i and t denote the countries and periods of time, respectively, to which the variables refer (Greene, 2008).

The relationships between target variables and policy instruments are estimated using two alternative specifications. First, the equation is estimated using the fixed effects approach in which the country dummies are included. Second, it is assumed that country-specific

differences are fully accounted for by the regressors X_{jit} . This specification is estimated using the random effects approach. The estimated model specification is:

$$Y_i = \alpha + \beta_1 Netfoodexp + \beta_2 \log GDPperCapita + \beta_3 \log NetTax + \beta_4 \log RurPop + \beta_5 \log NRA + \beta_6 DMacSharry + \beta_7 DAgrAgenda + \varepsilon, \text{ where } i = 1 - 5 \quad (3)$$

For all five target variables, presented in Table 1, the estimated empirical models are similar specifications with seven independent variables. Due to the lack of direct theoretical basis, the initial selection of model variables is based on the reviewed literature and intuition. The final selection was made based on the overall statistical efficiency of the variables.

Table 1. Dependent variables summary

Variable	Specification	Source
Y1: Agricultural value added per worker (constant 2000 US\$)	Is adopted as the target variable for the development of agricultural productivity. Agricultural value added per worker measures the output of the agriculture sector less the value of intermediate inputs. Given the proportion per worker, it reflects the rational use of labour emphasised in the stated policy objective. Data are in constant 2000 USD.	World Bank
Y2: Net-entrepreneurial income index deflated with consumer price index (2005=100)	Is adopted as the target variable for a fair standard of living. Entrepreneurial income corresponds to the operating surplus (total returns-total costs): plus property income minus interest on debts payable by the farm and rents payable on land and other non-produced tangible assets rented by the farm. For the analysis proportioned to the general consumer price development. Directly comparable between countries and the data relatively well available. The main caveat is that net entrepreneurial income does not proportion farmers' incomes either to the general standard of living in the EU countries or to the income development in sectors other than agriculture.	Eurostat, Laborstat
Y3: Standard deviation of wheat prices	Is used as the target variable for market stabilisation. The producer price for wheat is used as the base due to the overall importance of wheat in the EU15 crop production. In order to reduce the effect of annual price variation due to production fluctuations caused, for example, by exceptional weather conditions, the standard deviation is calculated as the five-year moving average. Alternative specifications used in the estimations were wheat prices (euro/tn), annual standard deviation, annual variance, and variance of the five-year moving average.	European Commission, own modifications
Y4: Average self-sufficiency ratio (wheat and milk aggregated) (% ratio)	Is used to measure the availability of supplies. The self-sufficiency ratio is a very common measure both in the academic literature and in government programmes. Calculated as a percentage share of domestic production of total domestic consumption. Self-sufficiency is aggregated as an average of wheat and milk to cover both main production sectors covered by intervention programmes in the EU15.	Database of Agricultural Distortions
Y5: Food price index deflated with GDP deflator (2000=100)	Is used as the target variable for reasonable consumer prices. Deflated using GDP deflator. Deflator proportions food price development to general economic development. The main caveat relates to the fact that the development of food price indices is not proportioned either to general price development or the development of purchasing power.	Laborstat, World Bank

The independent economic and structural variables were selected based on intuition and statistical efficiency in the final estimations. The utilised variables were selected to fulfil the requirements for a structural and economic variable that has an exogenous role in agricultural policies. In the final model, the control variables included were net food exports, GDP per capita, net indirect taxes and rural population. In the final model, independent variables are included as logarithmic transformations, with the exception of the variable for net food exports and dummy variables for policy reform.

Instead of specific policy instrument variables, this study utilises the aggregate impact of agricultural policies, measured using nominal rate of assistance (NRA). Moreover, to emphasize the structural changes in the CAP, dummy variables for MacSharry reform and Agenda 2000 were included in the model (Table 2).

Table 2. Policy variables summary

Policy variables		
Nominal rate of assistance (%)	Aggregated variable for all price distorting agricultural policy instruments. Higher (lower) NRA indicates higher (lower) distortions. Includes all national support measures. If policies are effective, variables should have significant impact on all objectives.	Database of Agricultural Distortions
Dummy for MacSharry reform 1992	Captures the policy reform shock and shift towards less market distorting agricultural policies. Price support policies were abolished and farmers received full compensation for price reductions through direct hectare-based payments.	
Dummy for Agenda 2000 reform	Captures the policy reform shock and shift towards less market distorting agricultural policies. Price support policies were abolished and farmers received partial compensation for price reductions through direct hectare-based payments.	

3. Results

The econometric estimation results for each target variable are presented in Table 3. For each model, ordinary least squares (OLS), least squares with group dummy variables (FE) and generalized least squares (RE) estimates are provided. In each model, there are variables that lack statistical efficiency. However, none of the variables is statistically insignificant throughout the estimated models. Given the justification of the variables, none of them were dropped out from the final models, in spite of the statistical inefficiency.

Based on the utilised test statistics, the effects model is, with one exception, more efficient compared to the classical regression model only. The F-test suggests that in four out of five models the model fit increases when individual aspects are added. The fixed effects model was statistically more efficient in three out of five estimated models with all variables included. Thus, country-level heterogeneity has a statistically significant impact on the model outcome for three target variables. For control variables only, the fixed effects model was appropriate in four out of five estimations. However, for models 1 and 3 the Hausman test statistics suggest opposing model selections (FE, RE) for the model with policy variables included and the model with control variables only.

Table 3. Estimation results¹²

Target variable	Y1	Y2	Y3	Y4	Y5
Fixed effects (FE)/ Random effects (RE)	FE	FE	RE	FE	RE
Net food exports (million euro)	0.363*** (0.08)	.002* (.001)	0.0003 (0.0002)	0.0001*** (.00001)	-.0002 (.0003)
GDP per capita (constant USD) log	5022.8*** (1397.4)	-136.39*** (19.9)	-0.595** (0.351)	.084*** (.021)	-20.93*** (3.854)
Net indirect taxes (constant LCU) log	-7099.7** (3023.8)	77.03* (43.6)	.482** (.188)	-.194*** (0.06)	-2.517 (2.698)
Rural population log	-8093.6* (4803.8)	398.80*** (78.7)	-0.081 (0.205)	.146** (.079)	-4.863 (3.042)
Nominal rate of assistance log	-3579.1*** (857.5)	-59.58*** (12.5)	-1.344*** (.270)	-.002 (.012)	-19.92*** (2.834)
Dummy for MacSharry reform 1992	4992.3*** (824.3)	-14.60 (13.2)	-2.163*** (0.356)	-.059*** (.016)	-15.95*** (3.713)
Dummy for Agenda 2000 reform	4466.0*** (791.1)	-31.02** (12.12)	1.578*** (0.300)	-.023 (.016)	-7.033** (3.007)
Constant			-5.304 (5.291)		447.97*** (74.47)
Country-specific dummies					
Austria	243614.0**	-6262.4***		2.780	
Belgium	-	-		-	
Denmark	256960.0**	-5832.1***		3.473*	
France	249842.2**	-6132.5***		2.573	
Finland	284358.2**	-7136.8***		3.396	
Germany	283839.6**	-7269.8***		2.794	
Greece	-	-6517.0***		2.149	
Italy	232500.2**	-5987.2***		2.484	
Ireland	279320.96**	-7172.7***		2.368	
Luxembourg	-	-		-	
Netherlands	261483.66**	-6394.6***		2.634	
Portugal	238701.36**	-6595.8***		2.219	
Spain	260216.99**	-6942.9***		2.586	
Sweden	274031.35***	-6200.1***		3.257	
United Kingdom	278851.9***	-6662.3***		2.648	
OLS statistics					
Number of observations	252	254	308	308	292
R-squared	.88	.67	.36	.94	.58
Adj. r-squared	.88	.65	.32	.93	.56
F-test	99.52 (.000)	24.45 (.000)	8.60 (.000)	219.31 (.000)	20.16 (.000)
Chi-sq	544.82 (.000)	284.62 (.000)	138.42 (.000)	843.55 (.000)	256.60 (.000)
R-squared for the classical model					
Constant term only	.00	.00	.00	.00	.00

¹ All fixed effects models are OLS estimates with group dummy variables, all random effects models are GLS estimates.

² ***, **, * are statistically significant with 99, 95 and 90 per cent confidence levels, respectively, standard errors are in the parenthesis.

Group effects only	.52	.35	.08	.89	.28
X – variables only	.66.	.42	.27	.50	.44
X and group effects	.88	.67	.36	.94	.58
Effects model vs. classical model					
Lagrange multiplier test	830.5 (.000)	155.5 (.000)	3.3 (.069)	2394.8 (.000)	109.5 (.000)
Fixed vs. random effects					
Hausman test	20.92 (.004)	42.54 (.000)	12.0 (.10)	34.98 (.000)	11.00 (.139)

4. Discussion

Our results show that policy target variables have, in general, developed in the desired direction. The productivity of agriculture has increased, markets have been stable, self-sufficiency ratios have been achieved and the real-term food prices have declined. However, farmers' incomes have in general declined.

Although the general development of the target variables is similar in all countries included in the analysis, the country-level heterogeneity is significant. While common policies have contributed to market stabilisation and food price development with a common impact, the impacts have been more diversified for productivity development and net entrepreneurial income. It can be stated that the impact of agricultural policies is directly tied to structural and economic conditions in a particular country. This needs to be taken into account especially in the current policy planning and implementation.

The implemented agricultural policy reforms have improved the policy effectiveness in general. The main contribution of the implemented reforms has been to the use of resources in agriculture. Policy shift from coupled price support to direct payments has released resources from agriculture to be utilised in other sectors. In addition, policy reforms have led to increasing price variation. This is a self-explanatory impact in the sense that administrative price setting was reduced and later abolished in the policy reforms.

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