How does the general economy and the agriculture sector performance influence the farm producer support in the OECD countries?

Tomasz Siudek, Aldona Zawojska

Warsaw University of Life Sciences, Warsaw, Poland

Abstract: This paper assesses the effects of the performance of the OECD national economies and agricultural sectors on the farm producer support for the years 1986 to 2009. The study is complementary to the large amount of microeconomic research that highlights the importance of support to agricultural industry. Data for the analysis are taken from the OECD Producer and Consumer Support Estimates database and the World Bank World Development Indicators 2010 database. The Producer Support Estimate – PSE (expressed in absolute value, in percent of the total farm revenues and per 1 hectare of agricultural land) was taken as the dependent variable, whereas the selected indicators describing the performance of the economies (e.g. GDP per capita, unemployment, fiscal balance, government debt, government expense and tax revenue, exchange rate, agriculture share in GDP and employment, agricultural raw materials exports and imports) were the independent variables. Utilizing these variables, a simple linear regression analysis was conducted and resulted in many significant associations. In the period analyzed, there was a wide gap between the most and least farm supporting countries in terms of the annual average percentage PSE and the PSE per hectare. Substantial differences between the countries in the variability of the PSE over the time occurred. The empirical results obtained from the regression models reveal, among other, that when the countries were becoming richer, the percentage PSE was generally decreasing. Mixed results were obtained for the relationship between the percentage PSE and unemployment, as in some countries it was negative, while in the others positive. Expansionary fiscal policy exerted opposite effects on the PSE in different countries. Labour productivity in agriculture was inversely correlated with the percentage PSE.

Key words: agricultural policy, producer support estimate, developed countries, macroeconomics

Scholars have long been interested in determining and explaining the levels of the government support to agriculture in different countries. In terms of welfare economics, arguments for this support in rich countries are found in the links between agriculture and positive external effects or public goods like food security, landscape amenities, preservation of rural communities and rural lifestyle (Drake 1992; Brunstad et al. 2007).

Park and Jensen (2007) consider agricultural subsidies in the developed countries as a type of distributive policy that targets the agricultural sector at the expense of consumers and taxpayers. According to Anderson et al. (1986), the universal protection of agriculture among developed countries can be explained by the rise in social affordability of the total tax burden associated with agricultural protection due to the rise in the taxpayers' income. Swinnen (2009) emphasizes that, with economic growth, the share of agriculture in labour force is declining, and consequently the per unit costs of increasing farm incomes through protection decrease for the rest of society. With a diminishing share of agriculture in employment, studies drawing on the logic of collective action (Olson 1965) have presumed that this makes farmers to supply political influence at lower (marginal) costs than other (larger and less coordinated) special interest groups, such as consumers and taxpayers, for instance (see e.g. Bilal 2000; Knetter and Prusa 2003; Jonsson 2007; Furtom et al. 2009).

The literature covering research on the political economy of agriculture and agricultural policies[1] has recently stressed the role of constitutions in the redistributive policies implemented by the government. For instance, the empirical results for the OECD countries obtained by Anderson et al. (1986) demonstrate that electoral systems that encourage politicians to target narrow (broad) constituencies are associated with relatively high (low) levels of agricultural subsidies.

Amongst several issues related to agricultural support, there are those connected with risk and uncertainty. Governments intervene on farmers' income risk through stable macroeconomic parameters (inflation,

interest rates, and exchange rate), social policies, fiscal policies and agricultural policies as well. According to the available studies (Mishra and Goodwin 1998; Hardaker et al. 2004; OECD 2005; Serra et al. 2005; Hardaker and Lien 2010), farmers as a group are risk averse, although the degree of risk aversion varies across farmers and from one country to the next. Risk effects of agricultural support policies occur in an uncertain world when farmers are risk averse and support policies either reduce the revenue variability and/or increase income (OECD 2006; Antón 2008).

In recent years, risk-related measures have comprised two-thirds of the total average support to the OECD producers, as measured by the Producer Support Estimate (PSE). In almost all OECD and emerging economies, their share has reached over 50% of the PSE (OECD 2009; Špicka 2010). To mitigate risk, most OECD countries offer the Market Price Support (MPS) through border measures that typically stabilise domestic prices. The MPS, as a component of the PSE, represents transfers to producers from consumers arising from the measures that create a gap between the domestic market prices and border prices of specific agricultural commodities, after deducting taxes paid by the producers to finance exports and the excess feed cost arising from these measures (Butault 2011).

Statistical investigation of agricultural support policies in all OECD countries indicates that most forms of that support decrease the revenue variability (some to a large extend), although the MPS, as the most widespread risk-related measure and in most OECD countries, is the main risk reducing type of support (OECD 2004, 2006). However, the developed countries shifted their agricultural policies by a gradual removal of governments from the management of commodity markets.

Agricultural support in the developed countries has been empirically examined for many different purposes, especially from the point of its impact on farm economy (e.g. input, output, income, prices, technology, investment, farm structure etc.), consumers (e.g. food prices, obesity), international markets and developing countries (Salhofer and Schmid 2004; Peterson Zwane and McMillan 2006; Alston et al. 2008; Latruffe et al. 2008; Whitaker 2009).

Unfortunately, we found a limited number of studies investigating the impact of the macroeconomic and especially fiscal factors on the farm producer support. Among these studies, there are those exploring the effects of the exchange rate on agricultural policy measures such as the MPS or PSE (see Schuh 1974; Inomata 1986; Bojnec and Swinnen 1997; Liefert 2011). The general economic performance (measured by GDP, GVA, unemployment rate) as a determinant of the regional producer support in Germany was studied by Anders et al. (2007) as well by Elsholz and Harsche (2008).

Many factors in the national economy, outside the field of agricultural policy, have an impact on the farm revenue and income. The overall prosperity of farm producers is inevitably tied to the welfare of the entire population, national employment or unemployment, international trade, monetary and fiscal policies. Furthermore, any changes in the macroeconomic environment are likely to have major effects on agriculture, taking as an example the latest global economic crisis.

This crisis, which has turned from a financial crash to an economic crisis, has increased the pressure on the governments' budgets. Almost all developed economies are presently struggling with a debt problem which may eventually provoke adjustments of their agricultural policies. For agriculture, fiscal constraints usually led to successive cuts in farm program support. As public debts will continue to rise, painful spending cuts would make voters more sensitive to some agricultural expenditures. It is especially important for the future Common Agricultural Policy as the EU Member States, mainly those being net contributors to the Community budget, beset with the economic downturn and public debts would reject the profligate CAP. Any policy changes are an important source of risk to farmers.

The rest of this paper is organized as follows. Section two presents the underlying data used for the empirical analysis and explains the methodology. Section three presents and discusses our empirical results. The final section summarises the main findings and offers some concluding remarks.

MATERIAL AND METHODS

The main objective of the paper is to identify the relationship between country's macroeconomic performance and agricultural support, or more specifically to answer the questions: (i) How do development and fiscal indicators influence the agricultural producer support? (ii) How do these effects differ between the OECD countries?

A comprehensive review of the recent available literature covering material related to agricultural support and its connections with the general mac-

[1]Comprehensive summary and review of that literature can be found in the papers of Henning and Struve (2007), Swinnen (2009) and Dutt and Mitra (2009).

roeconomic performance formed the basis of the empirical research.

To obtain an overview of the relationship between the PSE and the relevant macroeconomic and fiscal variables, we collected data on a sample of member countries of the Organisation for Economic Cooperation and Development (OECD). All countries, with the exception of Turkey and Mexico, were taken into consideration, with the EU treated as one country[2]. The investigation period covers the years from 1986 to 2009. However, not all considered data were available for all countries in our sample for this length of time. In such cases, the analysis was restricted to shorter periods.

The source of the data on the level of agricultural support has been annual statistics of the OECD on the Producer Support Estimates (PSE). This indicator measures the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers at the farm-gate level, arising from the policy measures that support agriculture, regardless of their nature, objectives or impacts on farm production or income (OECD 2010, p. 17). The PSE reflects support going directly to farmers.

PSEs have been constructed to evaluate and monitor agricultural policy changes (Josling and Valdes 2004) and, as indicated by Tangermann (2006, p.143), it is not an exercise in estimating the effects of policies, but an attempt at measuring the efforts made by the policy makers.

To establish the association between the macroeconomic, fiscal, agriculture indicators and the PSE measures, simple linear regression models were used, i.e. the PSE was regressed on each exogenous variable independently. The R^2 value was examined for each regression as an indication of the goodness of fitting of the model. There were good reasons not to expect strong correlations between the PSE and the selected variables, as simple correlations may fail to be significant because of the omission of other variables. Significance of the estimated regression coefficients was tested using the Student's test (Rao 1982; Dobosz 2001).

The PSE measures (PSE expressed in absolute value, in percent and per 1 hectare of agricultural land) were used as independent variables. The percentage PSE (PSE%) is the ratio of the PSE to the value of the total gross farm receipts (including budgetary support).

The PSE data were statistically analyzed with the standard procedures of the analysis of variance (ANOVA). The methodology for the examination of instability in agricultural policy was to calculate the variation in the PSE for the period 1996–2009 on the basis of standard deviation (SD) and the coefficient of variation (CV).

The explanatory data applied for the empirical analysis were the aggregated data for the member states of the OECD and the European Union as well as the data for individual states drawn from the World Bank WDI 2010 database. As a country's economy is a complicated area, several variables can impact the farm support; some of them are controlled by the government, and some are not. The government-controlled changes include, for instance, changes in the government spending and changes in taxes. Numerous potential variables representing the macroeconomic and fiscal situation during the period studied were first taken into consideration, but finally we selected those reported in the Table A1 (see Appendix).

Some of the data were additionally used as inputs in the cluster analysis of country groups (Hartigan 1975). The Ward's method (hierarchical process) was here adopted. All the variables considered were standardised. Countries were grouped together according to their homogeneity on the basis of their general macroeconomic performance or the agricultural sector performance. The resulting clusters were graphically displayed as the dendrograms.

RESULTS

The levels of support to farm producers and its variation over the 1986–2009 period

During the period 1986–2009, there was a marked progress in agricultural policy reform within the OECD countries resulting, among others, in changes in the PSE level and its composition. Regrettably, there is not sufficient room here for outlying the evolution of the OECD agricultural policy in depth, although it has recently been the subject of several studies (e.g. Bielik et al. 2007; Butault 2011).

Despite the fact that the reduction of agricultural support has been a subject of considerable international and domestic debates for the past two decades, in several rich countries it still remains high. In 2009, the value of support to producers in the OECD area reached USD 253 billion or EUR 182 billion. The EU was the largest supporter providing around $121

[2]The EU covers 12 countries until 1994, 15 countries as from 1995, 25 countries as from 2004 and 27 countries as from 2007. Merely four of the EU Member States that acceded in 2004 (the Czech Republic, Hungary, Poland and Slovak Republic) were the OECD members in 2009 and only their data are obtainable in the OECD database.

billion or 48% of the reported total 2009 PSE. The cumulative share of the EU and three other countries, i.e. Japan (18% or $46 billion), the United States (12% or $31 billion) and Korea (7% or $17 billion) was at 85% of the total support. On the other hand, in 2009 the farm support was almost non-existent in Australia ($0.9 billion or 2.7% of farm receipts) and New Zealand ($0.34billion or 0.35% of farm receipts).

Table 1 illustrates how the PSE annual average levels and their inter-temporal variation over a twenty-four year period differed between the OECD countries.

The lowest annual average levels of the total PSE for 1986–2009 were found in New Zealand and Iceland, while the highest one in Japan. Considering the annual average (over the period 1986–2009), as much as 31 cents in each dollar of the revenue for the average farmer in the OECD countries came from the government support. Only the rest was earned in the market. The minimum PSE share in the total producer receipts was in New Zealand, whilst the maximum in Switzerland, Norway and Iceland. In terms of support per hectare, Japan and Korea (with the support

Table 1. Inter-temporal variation in PSE (summary statistics), 1986–2009

Countries	Measure of support	*N*	Mean	SD	CV (%)
	PSE (Mill. $)	24	1 244.5	336.0	27.0
Australia	PSE (%)	24	6.1	2.7	44.5
	PSE/ha ($)	22	3	0.7	26.9
	PSE (Mill. $)	24	5 340.9	1 387.2	26.0
Canada	PSE (%)	24	23.5	7.5	32.1
	PSE/ha ($)	22	77	19.9	25.8
	PSE (Mill. $)	24	173.9	38.4	22.1
Iceland	PSE (%)	24	66.4	7.7	11.6
	PSE/ha ($)	22	77	16.6	21.5
	PSE (Mill. $)	24	49 468.9	8 835.5	17.9
Japan	PSE (%)	24	56.5	5.2	9.1
	PSE/ha ($)	22	9447	1 514.8	16.0
	PSE (Mill. $)	24	18 289.6	4 055.1	22.2
Korea	PSE (%)	24	63.7	7.2	11.3
	PSE/ha ($)	22	9 132	2 363.3	25.9
	PSE (Mill. $)	24	108.6	158.5	145.9
New Zealand	PSE (%)	24	2.1	4.1	192.4
	PSE/ha ($)	22	7	9.9	133.6
	PSE (Mill. $)	24	2 964.4	410.8	13.9
Norway	PSE (%)	24	67.6	3.9	5.7
	PSE/ha ($)	22	2 824	390.5	13.8
	PSE (Mill. $)	24	5 317.1	596.3	11.2
Switzerland	PSE (%)	24	68.5	5.6	8.2
	PSE/ha ($)	22	3 141	437.4	13.9
	PSE (Mill. $)]	24	36 285.9	8 633.9	23.8
United States	PSE (%)	24	16.8	5.0	29.7
	PSE/ha ($)	22	88	21.3	24.2
	PSE (Mill. $)	24	109 531.0	16 256.5	14.8
EU	PSE (%)	24	33.00	4.8	14.7
	PSE/ha ($)	22	538	88.9	16.5
	PSE (Mill. $)	24	251 527.0	17 159.8	6.8
OECD	PSE (%)	24	30.6	4.6	15.0
	PSE/ha ($)	22	192	14.6	7.6

Notes: *N* = number of observations; SD = Standard deviation; CV = Coefficient of variation

Source: Own calculations

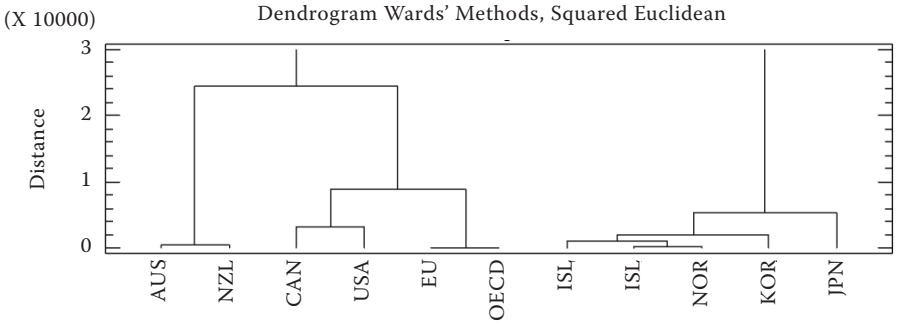

Figure 1. The dendrogram of the clustering of the OECD countries according to the percentage PSE in the period 1986–2009

AUS – Australia, CAN – Canada, CHE – Switzerland, ISL – Iceland; JPN – Japan, KOR – South Korea, NOR – Norway, NZL – New Zealand, USA – the United States

Source: Own calculations

above $9 thousand) differed significantly from other countries. Australia, Canada, New Zealand and the USA ranked below the OECD average both in terms of the %PSE and the PSE per hectare.

To identify distinct groups of the developed countries on the basis of the annual average percentage PSE, the cluster analysis method was adopted and it resulted in three clusters (Figure 1).

Cluster 1 contains two countries: Australia and New Zealand, in which producers received the lowest levels of the assistance equivalent to the estimated 6% and 2% of their gross receipts. Cluster 2 is based on Canada, the USA, the EU and the OECD as a whole. All countries that recorded more than one half of support in the producer's revenues (Iceland, Norway, Switzerland, Korea and Japan) are situated in third cluster.

Referring again to the Table 1, a considerable time variation in all three measures of support is evident in New Zealand and Australia, i.e. the countries with the lowest annual average levels of the relative PSE (% and per hectare).

Contrary, in Norway and Switzerland, that are the most generous to their farmers if the %PSE is taken into consideration, the variation in the producer support in 1986–2009 was relatively small. Comparing the EU and the USA, the speed of the PSE change was larger in the USA. Since 1986, the USA have significantly reduced the total (by 20%) and percentage (by 59%) PSE. In the EU, the percentage PSE decreased only moderately (by 38%), while the total PSE was affected by the EU enlargement. Over the period 1986–2009, the PSE in the EU was more stable than in the USA; the coefficient of variation of the %PSE and the PSE per 1 ha was 29.7% and 24.2%, respectively, for the US compared with 14.7% and 16.5% for the EU. Thus, on the basis of the above results, the EU farmers were facing a much lower exposure to the volatility of agricultural policy and prices than their US counterparts.

Economic similarities and differences across the OECD countries

Before examining the relationship between the macroeconomic and fiscal variables and the PSE measures, we looked at the differences among the OECD countries and classified them into relatively homogenous groups. We used two sets of indicators:

– Macroeconomic indicators: GDP, GDP per capita, GVA, Unemployment Rate, Inflation, Government Cash Surplus/Deficit, Central Government Debt, Government Expense, Subsidies and Other Transfers, Tax Revenue, Taxes on Goods and Services;
– Agriculture sector indicators: Agricultural Value Added, Agriculture Value Added per Worker, Employment in Agriculture, Agricultural Raw Materials Imports and Exports, Food Imports and Exports.

The number of clusters and the classification of countries were determined by the visual inspection. Dendrograms regarding clustering of the OECD countries are given by the Figure 2 and the Figure 3.

Considering macroeconomic characteristics, the OECD countries can be classed into four coherent groups. Cluster 1 groups together three countries: Australia, Norway and Iceland (Figure 2). The UN data collected prior to the global economic crisis (2007) showed that people in those tree countries had the best living standards, when the Human Development Index – HDI (the country's economy, life expectancy, literacy rates and school enrolment) is taken as a measure (UNDP 2009). The second cluster consists of the EU countries and Korea. Again, our results are

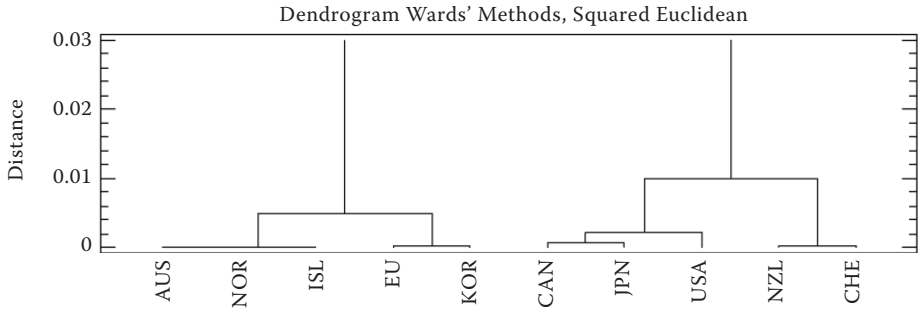

Figure 2. The dendrogram of the clustering of the OECD countries according to macroeconomic indicators in the period 1986–2009

AUS – Australia, CAN – Canada, CHE – Switzerland, ISL – Iceland; JPN – Japan, KOR – South Korea, NOR – Norway, NZL – New Zealand, USA – the United States.

Source: Own calculations

similar to those of the UNDP: the 2007 HDI had the same value for the EU and Korea. The third group combines Canada, Japan and the USA, i.e. the North Pacific Triangle. Finally, New Zealand and Switzerland form the fourth cluster. Segers (2004), for example, who was comparing economic growth rates for the OECD countries (Australia, Canada, New Zealand, Japan, the USA and 12 Western European countries) during the 20th century found that Switzerland and New Zealand tended to behave quite differently compared to the other countries.

The cluster analysis of agricultural variables (Figure 3) suggests five groups of countries. Those are as follows: (1) Australia and Iceland; (2) New Zealand; (3) Canada, the USA, Norway, Switzerland and Japan; (4) the EU; (5) Korea. Thus, as the groups of the OECD countries reveal a different pattern of the agriculture sector performance, the implication for our further analysis is to expect different impacts of both macroeconomic and the sector characteristics on the PSE measures in the individual countries.

Determinants of the Producer Support Estimate

In this subsection, we compare the influence of domestic macroeconomic variables, fiscal policy variables and agriculture variables on the evolution of the PSE measures.

Empirical evidence on agricultural protection from numerous studies suggests the positive correlation between agricultural protection and the average country incomes across countries. Swinnen et al. (2001) who conducted their empirical study covering 100 years of the history of agricultural protection in Belgium, show that the impact of economic development on some agricultural policies is conditional on the level of development. They found that protection and support to farmers were positively determined by

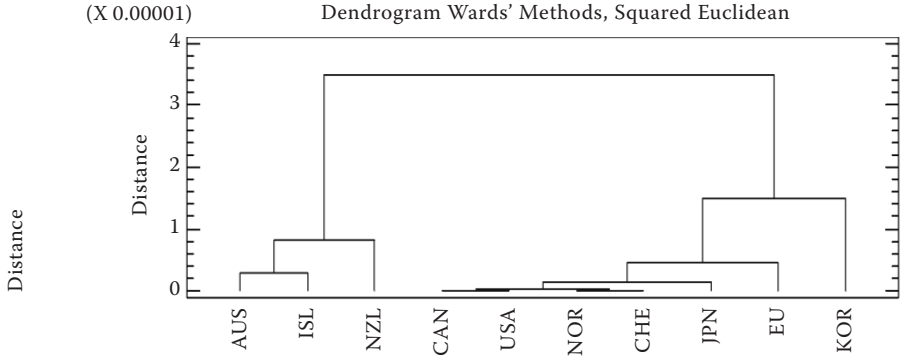

Figure 3. The dendrogram of the clustering of the OECD countries according to the agricultural sector indicators in the period 1986–2009

AUS – Australia, CAN – Canada, CHE – Switzerland, ISL – Iceland; JPN – Japan, KOR – South Korea, NOR – Norway, NZL – New Zealand, USA – the United States.

Source: Own calculations

the share of agricultural commodities in the total output of the economy.

The ESPON empirical study[3] reveals, with 1999 data, that the value of the market price support (MPS) under the Pillar 1[4], expressed per hectare of agricultural land, was positively correlated with GDP per capita (r = 0.11) and negatively correlated with the unemployment rate (r = –0.37) in the NUTS3 regions. On the other hand, direct income transfers tended to be higher in the regions with a low GDP per head (r = –0.16) and with high unemployment rates (r = 0.21). As concerns the new EU Member States, the results differed between them. For example, in Poland the MPS per 1 ha UAA in 1999 was negatively correlated with the unemployment rate (r = –0.33) but no statistically significant correlation with the GDP per capita across the regions was found. In contrast, in the Czech Republic, the MPS tended to be higher in the regions with a low GDP per capita (r = –0.72), whereas its correlation with the unemployment rate was not statistically significant (Shucksmith et al. 2005, p. 61, 65).

Anders et al. (2004), who computed the PSE for the selected German regions, show that the CAP producer support flows more to poorer regions, when the PSE per hectare is utilised, but this is not the case when the relative PSE is considered. As far as agricultural foreign trade is concerned, protection of the sector in many countries is found to increase with the decreases in the trade surplus (Swinnen 2009).

In our study, we found a significant statistical relationship between the PSE measures and many, although not all and not in all countries, macroeconomic and fiscal performance variables over the studied period (for detailed results, see Table A2 and Table A3 in the Appendix). In order to make results of our analysis easier to read, we also summarized them in the Table 2.

The absolute and per capita GDP was significantly and negatively related to the percentage PSE in all, except New Zealand, countries with the strongest correlation (values ≤ –0.75) in Australia, Korea and the EU (Table A2, Appendix). The regression results suggest that when countries become richer, the producer support share in farm revenues decreases. The whole economy gross value added (GVA) was also significantly and negatively related to the %PSE in all countries, where the data were available.

There was also an interesting negative strong correlation between the %PSE and unemployment rate in the OECD area (r = –0.85), as well as a moderate one in Korea (r = –0.43). On the contrary, a positive moderate correlation between the %PSE and unemployment was recorded for Australia and the EU as a whole, while in other countries our analysis found no statistically significant relationship between those variables. Only in a few countries the producer support per hectare of agricultural land was significantly (positively) correlated with the GVA, GDP and the per capita GDP (Korea and the EU), as well as with the rate of unemployment (Switzerland and Norway). Regression of the absolute PSE on the unemployment rate shows its negative effect on the total value of support to farmers in Island and the United States only.

The PSE measures were differently related to the fiscal performance of the countries (Table A3, Appendix). In New Zealand and the USA, the fiscal balance to the GDP ratios was significantly and positively correlated with the absolute level of the PSE (r = 0.82 and r = 0.60 respectively), while in Switzerland and the OECD as a whole, there was a moderate inverse correlation between those two measures. No significant results were obtained for other countries. The fiscal balance also explains the variation of the percentage PSE in some countries. In Norway and Canada higher surpluses reduced the share of PSE in producer revenues (r = –0.88 and r = –0.52) as opposed to Iceland and the USA. Furthermore, the fiscal balance had effects on the PSE per hectare, but merely in three countries: positive in New Zealand and the USA and negative in Switzerland.

Additionally, the regression results indicate that increases in the central government debt had a negative effect on the absolute level of the PSE in such countries as Australia, Island, Korea and the USA, but a positive effect was observed in Norway. In the EU and the OECD, the percentage PSE was positively and moderately correlated with the debt, while in the USA, there was a strong but negative relationship. Also the producer support per hectare was affected by the debt in the USA, Korea and Australia (negatively) and in Norway (positively).

Cutting the government expenditures, transfers and subsidies and increasing taxes is often an effective way to contribute to the fiscal stabilization and market deregulation, but it may harm farm produc-

[3]The study was carried out over the period 1990 to 2000 at the NUTS-3 level and covered the EU-15 as well as the neighbouring and candidate states (see ESPON 2004).

[4]EU expenditure on the CAP (costs for taxpayers) excludes, however, the major component of the PSE arising from the effects of non-expenditure instruments (ex. import barriers) in rising the domestic EU prices for agricultural products above their levels outside the EU.

ers. Government expenses (as % of GDP) appeared to have a significant impact on the absolute PSE only in the USA (with a negative sign). As the expense increased, the %PSE tended to increase in Norway, Canada and Switzerland and to decrease in Island, Korea and the USA. In all countries, excluding the USA, the PSE per hectare was not affected by the government expenses.

Table 2. Statistically significant relationships between PSE measures and selected variables in the OECD countries, 1986–2009

Variables	PSE (S)		% PSE		PSE/ ha	
	direction of the relationship					
	direct	inverse	direct	inverse	direct	inverse
GVA	EU			AUS, EU, JPN, KOR,	EU, KOR	
GDP	EU, KOR			AUS, CAN, EU, ISL, JPN, KOR, NOR, OECD, CHE, USA,	EU, KOR	
GDP.PCAP	EU, KOR	AUS		AUS, CAN, EU, ISL, JPN, KOR, NOR, OECD, CHE, USA	EU, KOR	
UEM.TOTL		ISL, USA	AUS, EU	KOR, OECD	NOR, CHE	
BAL.CASH	NZL, USA	CHE, OECD	ISL, USA	CAN, NOR	NZL, USA	CHE
DOD.TOTL	NOR	AUS, ISL, KOR, USA	EU, OECD	USA	CAN	CAN
XPN.TOTL		USA	CAN, NOR, CHE	ISL, KOR, USA		USA
XPN.TRFT	CAN	NOR		EU, OECD		NOR
TAX.TOTL	ISL	JPN, CHE		JPN, KOR, OECD	NZL, USA	JPN
TAX.GSRV	EU	NOR	CAN, ISL, KOR, NOR, USA, OECD		EU	NZL
GVA.AGR		EU, ISL, KOR	AUS, CAN, EU, ISL, JPN, KOR, NOR, OECD			EU, KOR
PRD.AGR	EU	AUS, JPN, NZL		AUS, CAN, EU, JPN, KOR, NZL, NOR, CHE, OECD	EU, KOR	AUS, NZL
AGR.EMPL		ISL, KOR	AUS, CAN, EU, JPN, KOR, NOR, OECD, CHE, USA			KOR, CHE
RUR.TOT	NZL	KOR	AUS, CAN, EU, ISL, JPN, KOR, NZL, NOR, OECD, CHE, USA		NZL	EU, KOR, CHE
TM.VAL.AGR	AUS, NZ	EU, KOR, NOR	AUS, CAN, EU, ISL, JPN, KOR, NZL, OECD, CHE, USA		AUS	EU, ISL, KOR
TX.VAL.AGR	NZL	EU	AUS, CAN, EU, KOR, NZL, CHE, OECD		NZL	EU, CHE
TX.VAL. FOOD	CAN, CHE		AUS, EU, ISL, KOR, NOR, OECD			KOR
TM.VAL. FOOD	CAN	ISL, USA	EU, KOR, CHE, OECD		AUS	KOR
GDP.DEFL[1]		NZL		CAN, ISL, KOR, NZL, OECD	CAN, NZL	CHE
OXR[2]		CAN, ISL, NOR, CHE	CHE	ISL, KOR		JPN, NOR, CHE

Notes: See Table A1 (Appendix) for definition of variables

[1]Inflation, GDP deflator (annual %); [2]Official exchange rate (local currency unit per USD, period average)

Source: Own calculations

Subsidies and other transfers (as % of the expense) determined the absolute value of the PSE in Norway (negative sign) and in Canada (positive sign). Generally, no significant relationship of subsidies and transfers with the %PSE was observed in individual countries, however, it was high and negative for the aggregate data for the EU (r = –0.81) and OECD (–0.74). Producer support per hectare was statistically significantly related to subsidies and transfers in Norway (r = –0.96).

The strong correlation between the total PSE and the tax revenue (% of GDP) was recorded in Iceland (positive) and in Japan (negative). Also in Switzerland the PSE value was decreasing with the rising tax revenue, but the relationship was weaker. In the OECD as a whole, Korea and Japan, the percentage PSE was moderately-to-strongly negatively correlated to the tax receipts. The results suggest also that, other things being equal, the tax revenue had a positive effect on the PSE per hectare in the USA and New Zealand, but a negative one in Japan. Revenues from taxes on goods and services (as a percentage of the government revenue) had exerted a positive statistically significant impact on the percentage PSE in Canada, Island, Korea, Norway, the USA, as well as in the OECD area as a whole. There was no clear relationship between the indirect taxes revenue and the PSE in monetary terms.

Additionally, we found the evidence that the nominal exchange rates (local currency unit per 1 US$) had an impact mainly on the monetary value of the producer support. Negative regression signs (not presented in tables) indicate that, as expected, the depreciation of national currencies against the US dollar was associated with the decrease in the absolute PSE; with significant effects for Canada, Iceland, Norway and Switzerland. The depreciation (appreciation) of the national currency, *ceteris paribus*, leads to narrowing (widening) the gap between the domestic producer prices and border prices having impact on the MPS. The effect of inflation (GDP deflator, annual %) on the value of the PSE was statistically significant only in New Zealand (r = 0.94). A moderate to very strong positive correlation (0.42–0.92) existed between the inflation and the percentage PSE in such countries as Canada, Iceland, Korea and New Zealand, as well in the OECD as a whole (Table 2).

The next step in our research was to ask whether different measures of the agricultural sector performance (such as the agriculture share in the economy, employment and foreign trade, as well as the labour productivity in agriculture) had any ability to explain the variability in the PSE measures.

Looking at Table A4 in the Appendix, it is remarkable that the estimated coefficients measuring the effects of the agricultural value added (as % of GDP) and agricultural employment (as % of the total employment) on the percentage PSE are mostly significant and always display the positive sign. It suggests that with shrinking agricultural economy in the developed countries, the contribution of support to farm receipts was declining. Interesting is, however, that both in Switzerland (ranked at a top position in terms of the average %PSE during 1986–2009) and New Zealand (ranked at a bottom position, respectively) the %PSE was not significantly correlated with the agricultural value added (in the latter country also with employment).

In the OECD as a whole and all individual countries, the PSE as a percentage of farm revenues was inversely associated with the productivity in agriculture (AVA per worker); although for Island and the USA the correlations were not statistically significant. It can explain why maintaining high domestic prices for agricultural commodities and other forms of support have been important policy tools used to increase the value of output per 1 worker. Taking the PSE per hectare, it was significantly and negatively influenced by the agricultural value added (the EU and Korea), by the employment in agriculture (Korea and Switzerland), and by the agricultural productivity (Australia and New Zealand). The results for the EU and Korea show a positive moderate correlation between the PSE per hectare and the productivity in agriculture.

The results indicate a significant positive relationship between the percentage PSE and rural population (as % of the total population) in all individual countries as well as in the EU (r = 0.77) and the OECD (r = 0.85) as a whole. However, if the absolute PSE is considered, the coefficients are mostly not significant, except for New Zealand (r = 0.57) and Korea (r = –0.56).

Finally, as agricultural trade is a key factor in the agricultural policy of developed countries, we investigated how the agro-food foreign trade determined the PSE measures. Among the attributes, the agricultural raw materials imports (as % of merchandise imports) are clearly significant in explaining the PSE measures in the majority of countries (Table 3 and Table A5 – Appendix). The percentage PSE appears to be positively influenced by agricultural imports in all countries with the exception of Norway. A strong correlation between the two (r = 0.8) was observed in Australia and in the entire OECD. Also food imports were significantly and positively correlated with the %PSE although in a smaller number of countries, with the highest correlation (r = 0.72) obtained for the OECD area as a whole. The direction of association

between the %PSE and the exports of agricultural raw materials and food was quite similar.

On the other hand, not in all countries for which the results are significant, the absolute PSE was positively correlated either with the agricultural raw materials imports or exports. In Norway, Korea and the EU, the coefficients for imports had negative values. In the EU also agricultural exports were negatively linked to the monetary measure of the PSE.

There appears to be an inverse relationship between the PSE value and food imports in Iceland and the USA. Food exports and imports variables were generally insignificant (apart from Korea) in explaining the variation in the PSE per hectare.

CONCLUSIONS

In the present hard times, when the governments are dealing with rising budget deficits and public debts whereas the agriculture industry is struggling to maintain its "safety net", the basic question is, how much public money is spent by the world's richest nations on supporting their agricultural sector or how much is the overall value of money transferred through agricultural policies.

This paper investigates the role of the macroeconomic and sectoral factors in explaining the producer support estimate in the OECD countries over the period from 1986 to 2009. Our study is complementary to the body of the microeconomic research that highlights the importance of the producer support to agricultural industry, specifically its farm-level impacts. To examine the relationship between the PSE measures (expressed in the absolute value, in percent of the total farm receipts and per 1 hectare of agricultural land) and different variables describing economies of the selected countries, we used simple statistical methods in order to avoid difficulties in interpreting our results.

Our main findings and conclusions are summarized as follows:

(1) Besides the fact that all analyzed countries belong to the group of the most developed world economies, they differ widely both with respect to the size and time variation of the agricultural producer support as well as with respect to the macroeconomic and fiscal performance.

(2) Over the period analyzed, there was a wide gap between the most and the least supporting countries in terms of the annual average percentage PSE (ratio as 11 to 1) and the PSE per hectare (ratio as 3149 to 1). There were also substantial differences in the year-to-year variability in all three measures of support, with the highest degree of variation revealed for New Zealand and Australia, i.e. the countries with the lowest relative level of the PSE (% and per hectare), and the lowest degree in Norway and Switzerland being the most generous to their farmers in the terms of the percentage PSE. Those results suggest (although they need a further proof) that the higher levels of support minimize the risks and uncertainty faced by the farmers.

(3) An important observation is that in the whole OECD, the EU and the individual countries, labour productivity in agriculture was inversely correlated with the percentage PSE. It can explain why maintaining high domestic prices for agricultural commodities and other forms of support have been important policy tools used to increase the value of output per 1 worker.

(4) We did not find any proof for the hypothesis that a higher development level of any country under investigation implies a higher support level. The regression results suggest that when countries become richer (GDP per capita), the producer support share in farm revenues decreases. Mixed results were obtained for the relationship between the percentage PSE and unemployment, as in some countries it was negative, while in the others positive.

(5) Public debts and the expansionary fiscal policy exerted reverse effects on the PSE in different countries. For example, in the USA higher surpluses were associated with a higher producer support in the terms of all its measures, whereas in the whole OECD, the monetary value of the PSE was inversely related to the fiscal balance.

(6) For agricultural political economy researchers, it may be interesting that in all individual countries as well as in the entire EU and OECD, the level of producer support, at least when percentage PSE is considered, was significantly positively affected by the rural to the total population ratio. It can suggest that a higher (lower) political power in shaping agricultural policies is connected rather with a higher (smaller) size of the whole population in rural areas (i.e. the number of voters) than with the power of the farmers' interest groups. Some evidence for this is also given by the significant positive correlations between the percentage PSE and the share of agricultural employment in the total employment obtained for almost all countries and for the OECD as a whole, which indicates that when the relative employment in agriculture was shrinking, the share of the PSE in farm receipts was also diminishing.

APPENDIX

Table A1. Definitions and description of the explanatory variables

Variables	Names	Definition	Unit	Aggregation method
General economy				
Gross Value Added	*GVA*	The sum of the value added in the agriculture, industry and services sectors. If the value added of these sectors is calculated at the purchaser values, the GVA at factor cost is derived by subtracting net product taxes from the GDP.	Constant 2000 US$[1]	gap-filled total
Gross Domestic Product	*GDP*	The sum of GVA by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for the depreciation of the fabricated assets or for the depletion and degradation of natural resources.	Constant 2000 US$[1]	gap-filled total
GDP per capita	*GDP.PCAP*	GDP divided by the midyear population.	Constant 2000 US$[1]	weighted average
Unemployment	*UEM.TOTL*	The share of the labour force that is without work but available for and seeking employment. Definitions of labour force and unemployment differ by country.	% of total labour force	weighted average
Government finance				
Cash surplus/deficit	*BAL.CASH*	Revenue (including grants) minus expense, minus net acquisition of nonfinancial assets.	% of GDP	weighted average
Central government debt	*DOD.TOTL*	The entire stock of direct government fixed-term contractual obligations to others outstanding on a particular date.	% of GDP	median
Expense	*XPN.TOTL*	Cash payments for operating activities of the government in providing goods and services. It includes the compensation of employees, interest and subsidies, grants, social benefits, and other expenses such as rents and dividends.	% of GDP	weighted average
Subsidies and other transfers	*XPN.TRFT*	All unrequited, non-repayable transfers on the current account to private and public enterprises; grants to foreign governments, international organizations, and other government units; and social security, social assistance benefits, and employer social benefits in cash and in kind.	% of expense	median
Tax revenue	*TAX.TOTL*	Compulsory transfers to the central government for public purposes. Certain compulsory transfers such as fines, penalties, and most social security contributions are excluded.	% of GDP	weighted average
Taxes on goods and services	*TAX.GSRV*	General sales and turnover or value added taxes, selective excises on goods, selective taxes on services, taxes on the use of goods or property, taxes on extraction and production of minerals, and profits of fiscal monopolies.	% of revenue	median

Continuation of the Table A1

Variables	Names	Definition	Unit	Aggregation method
Agricultural sector				
Rural population	*RUR.TOT*	People living in rural areas as defined by the national statistical offices.	% of total population	weighted average
Agricultural value added	*GVA.AGR*	Agriculture includes forestry, hunting, and fishing, as well as the cultivation of crops and livestock production. Value added is the net output of the sector after adding up all outputs and subtracting intermediate inputs.	% of GDP	weighted average
Agriculture value added per worker	*PRD.AGR*	AVA per 1 worker is a measure of agricultural productivity.	Constant 2000 US$[1]	weighted average
Employment in agriculture	*AGR.EMPL*	Employees are people who work for a public or private employer and receive remuneration in wages, salary, commission, tips, piece rates, or pay in kind.	% of total employment	weighted average
Agricultural raw materials imports	*TM.VAL.AGR*	Agricultural raw materials comprise the SITC section 2 (crude materials except fuels) excluding divisions 22, 27 (crude fertilizers and minerals excluding coal, petroleum, and precious stones), and 28 (metalliferous ores and scrap).	% of merchandise imports	weighted average
Agricultural raw materials exports	*TX.VAL.AGR*	Agricultural raw materials comprise the SITC section 2 (crude materials except fuels) excluding divisions 22, 27 (crude fertilizers and minerals excluding coal, petroleum, and precious stones), and 28 (metalliferous ores and scrap).	% of merchandise exports	weighted average
Food imports	*TM.VAL. FOOD*	Food comprises the commodities in the SITC sections 0 (food and live animals), 1 (beverages and tobacco), and 4 (animal and vegetable oils and fats) and the SITC division 22 (oil seeds, oil nuts, and oil kernels).	% of merchandise imports	weighted average
Food exports	*TX.VAL. FOOD*	Food comprises the commodities in the SITC sections 0 (food and live animals), 1 (beverages and tobacco), and 4 (animal and vegetable oils and fats) and the SITC division 22 (oil seeds, oil nuts, and oil kernels.	% of merchandise exports	weighted average

[1]Dollar figures are converted from domestic currencies using the 2000 official exchange rates

Source: Authors' own compilation based on the World Bank (2010)

Table A2. General economic performance determinants of Producer Support Estimate, 1986–2009 (simple linear regression results)

Countries	Dependent variables	Independent variables							
		GVA		GDP		GDP.PCAP		UEM.TOTL	
		r	*b*	*r*	*b*	*r*	*b*	*r*	*b*
Australia	PSE ($)	–0.33	–1.39E–09	–0.37	–1.33E–09	–0.41*	–0.044*	0.26	43.08
	% PSE	–0.83**	–2.83E–11**	–0.84**	–2.46E–11**	–0.86**	–0.001**	0.61**	0.80**
	PSE/ha	–0.29	0.00	–0.28	0.00	–0.32	0.000	0.19	0.06
Canada	PSE ($)	na	na	0.23	2.39E–09	0.24	0.119	–0.25	–203.39
	% PSE	na	na	–0.63**	–3.64E–11**	–0.59*	–0.002*	0.35	1.67
	PSE/ha	na	na	0.02	0.0000	0.05	0.001	–0.06	–1.17
Iceland	PSE ($)	na	na	0.32	6.35E–09	0.40	0.004	–0.50*	–19.44*
	% PSE	na	na	–0.62**	–2.51E–09**	–0.53*	–0.001*	–0.24	–1.34
	PSE/ha	na	na	0.04	0.00	0.04	0.000	–0.32	–0.73
Japan	PSE ($)	–0.27	–4.94E–09	–0.28	–5.02E–09	–0.27	–0.700	–0.26	–2 203.30
	% PSE	–0.71**	–7.12E–12**	–0.71**	–7.51E–12**	–0.73**	–0.001**	–0.13	–0.59
	PSE/ha	0.15	0.00	0.15	0.00	0.15	0.069	0.12	171.53
Korea	PSE ($)	0.40	1.06E–08	0.41*	9.54E–09 *	0.43*	0.530*	–0.39	–1 327.69
	% PSE	–0.77**	–3.63E–11**	–0.76**	–3.19E–11**	–0.75**	–0.002**	–0.43*	–2.45*
	PSE/ha	0.68**	1.15E–12**	0.68**	1.01E–12**	0.70**	0.549**	–0.27	–503.79
New Zealand	PSE ($)	na	na	–0.33	–5.55E–09	–0.25	–0.027	–0.31	–24.21
	% PSE	na	na	–0.39	–1.69E–10	–0.31	–0.001	–0.23	–0.47
	PSE/ha	na	na	–0.28	0.00	–0.19	0.001	–0.37	–1.78
Norway	PSE ($)	0.03	5.43E–10	0.05	7.12E–10	0.00	–0.0001	0.37	121.17
	% PSE	–0.48*	–7.40E–11*	–0.51*	–6.36E–11*	–0.48*	–0.0003*	0.24	0.81
	PSE/ha	–0.39	0.00	–0.38	0.00	–0.41	0.030	0.44*	145.86*
Switzerland	PSE ($)	–0.11	–3.07E–09	–0.02	–4.82E–10	–0.07	–0.020	0.15	108.67
	% PSE	–0.69**	–1.72E–10**	–0.72**	–1.50E–10**	–0.73**	–0.002**	–0.19	–1.31
	PSE/ha	–0.13	0.00	0.32	0.00	0.18	0.040	0.69**	303.89**
United States	PSE ($)	na	na	0.17	8.05E–10	0.21	0.433	–0.48*	–4 497.60*
	% PSE	na	na	–0.47*	–1.26E–12*	–0.43*	–0.001*	–0.06	–0.30
	PSE/ha	na	na	0.18	0.00	0.19	0.001	–0.15	–4.77
EU	PSE ($)	0.50*	7.28E–09*	0.50*	6.51E–09*	0.48*	3.443*	–0.30	–3 768.33
	% PSE	–0.76**	–3.36E–12**	–0.76**	–3.01E–12 **	–0.75**	–0.002**	0.73**	2.55**
	PSE/ha	0.56**	0.00**	0.56**	0.0000**	0.54**	0.022**	–0.27	–19.55
OECD	PSE ($)	na	na	0.18	7.37E–10	0.18	1.161	0.17	0.87
	% PSE	na	na	–0.86**	0.0000**	–0.84**	–0.002**	–0.85**	–0.00**
	PSE/ha	na	na	–0.18	0.00	0.17	8 713.59	–0.17	0.00

Notes: See Table A1 for definition of variables; na = data are not available; *r* = correlation coefficient; *b* = regression coefficient; (**) and (*) denotes significance at the 0.01 and 0.05 level, respectively

Source: Authors' computations

Table A3. Fiscal determinants of Producer Support Estimate, 1986–2009 (simple linear regression results)

Countries	Dependent variables	Independent variables											
		BAL.CASH		DOD.TOTL		XPN.TOTL		XPN.TRFT		TAX.TOTL		TAX.GSRV	
		r	*b*	*r*	*b*	*r*	*b*	*r*	*b*	*r*	*b*	*r*	*b*
Australia	PSE ($)	0.54	295.56	−0.84**	−75.45**	−0.19	−74.84	0.41	97.21	0.30	113.64	0.22	31.31
	% PSE	−0.16	−0.17	−0.33	−0.06	0.03	0.03	0.15	0.07	−0.17	−0.12	0.24	0.07
	PSE/ha	0.54	0.59	−0.71*	0.14*	−0.07	0.06	0.29	0.13	0.10	0.03	0.40	0.28
Canada	PSE ($)	0.06	27.16	na	na	−0.17	−72.79	0.58*	223.06*	−0.29	−537.48	−0.20	−211.69
	% PSE	−0.52*	−0.99*	na	na	0.54*	0.95*	−0.24	−0.36	0.14	1.05	0.54*	2.28*
	PSE/ha	−0.16	−1.83	na	na	0.06	0.59	0.18	1.73	−0.43	−20.82	−0.01	0.37
Iceland	PSE ($)	0.43	3.36	−0.70**	−2.35**	−0.16	−1.46	0.33	3.76	0.86**	20.50**	−0.05	−0.61
	% PSE	0.59*	0.64*	−0.33	−0.15	−0.68*	−0.90*	0.08	0.13	0.14	0.46	0.95**	1.74**
	PSE/ha	0.10	0.12	0.17	0.05	−0.05	0.14	−0.51	−0.58	0.15	0.28	0.48	0.64
Japan	PSE ($)	na	na	−0.54	−520.85	na	na	na	na	−0.94**	−6 804.88**	−0.49	−1 771.76
	% PSE	na	na	−0.43	−0.18	na	na	na	na	−0.99**	−3.22**	−0.33	−0.54
	PSE/ha	na	na	−0.53	−96.68	na	na	na	na	−0.93**	−1281.97**	−0.48	−329.63
Korea	PSE ($)	−0.05	−149.16	−0.63*	−1 177.76*	−0.04	−56.58	0.39	315.15	0.12	478.36	0.01	7.98
	% PSE	−0.08	−0.56	0.19	0.54	−0.78**	−2.31**	0.22	0.38	−0.69**	−5.89**	0.76**	1.77**
	PSE/ha	−0.03	−57.09	−0.62**	−668.65**	0.28	226.68	0.28	125.11	0.43	1 086.80	−0.31	−204.66
New Zealand	PSE ($)	0.82*	24.47*	0.44	2.87	0.26	17.88	−0.08	−2.09	0.73	19.00	−0.75	−19.32
	% PSE	0.54	0.17	0.79	0.06	0.40	0.28	−0.15	−0.04	0.51	0.14	−0.39	−0.10
	PSE/ha	0.83*	2.05*	0.46	0.25	0.31	1.71	−0.10	0.20	0.76*	1.64*	−0.77*	−1.65*
Norway	PSE ($)	0.29	33.74	0.85**	39.39**	−0.17	−32.05	−0.89**	−142.51**	0.42	187.17	−0.79*	−148.30*
	% PSE	−0.88**	−1.08**	−0.52	−0.25	0.88**	1.70**	0.14	0.24	−0.51	−2.38	0.72*	1.42*
	PSE/ha	0.01	0.83	0.88**	33.52**	0.12	19.02	−0.96**	−122.97**	0.51	175.45	−0.66	−133.69
Switzerland	PSE ($)	−0.63**	−357.70**	−0.30	−37.43	0.29	44.38	−0.38	−45.00	−0.59**	−403.55**	−0.31	−29.51
	% PSE	−0.24	−1.13	0.06	0.07	0.49*	0.64*	−0.43	−0.43	−0.14	−0.79	−0.40	−0.32
	PSE/ha	−0.60*	−204.36*	0.14	10.64	0.26	24.16	−0.17	−12.16	−0.22	−92.08	−0.13	−7.49
USA	PSE ($)	0.60**	1 522.66**	−0.84**	−1 071.08**	−0.65**	−2 766.70**	−0.08	−224.96	0.43	2 464.84	0.55	9 960.70
	% PSE	0.59**	0.90**	−0.85**	−0.65**	−0.66**	−1.68**	−0.02	−0.04	0.38	1.32	0.67*	7.19*
	PSE/ha	0.86**	22.49**	−0.98**	−7.18**	−0.89**	−63.70**	0.15	6.31	0.64*	22.95*	0.00	0.44
EU	PSE ($)	−0.39	−3 938.59	−0.28	−524.31	0.11	1 250.69	0.44	2 963.35	−0.50	−12 889.70	0.63*	13 047.80*
	% PSE	−0.24	−0.62	0.68**	0.32**	0.44	1.22	−0.81**	−1.35**	−0.02	−0.11	−0.25	−1.31
	PSE/ha	−0.34	−17.54	−0.33	−3.23	0.05	2.95	0.43	17.41	−0.46	−60.74	0.78**	82.61**
OECD	PSE ($)	−0.62**	−11 934.10**	−0.04	−80.63	0.48	20 786.10	0.34	2 641.69	−0.13	−3 958.72	0.16	2 393.76
	% PSE	0.12	0.39	0.60*	0.27*	−0.39	−2.90	−0.74**	−1.22**	−0.60*	−3.25*	0.58*	1.78*
	PSE/ha	−0.12	0.45	−0.17	0.06	−0.05	−0.61	0.05	0.06	−0.45	−2.37	−0.12	0.32

Notes: See Table A1 for definition of variables; na = data are not available; *r* = correlation coefficient; *b* = regression coefficient; (**) and (*) denotes significance at the 0.01 and 0.05 level, respectively

Source: Authors' computations

Table A4. Agricultural sector determinants of Producer Support Estimate, 1986–2009 (simple linear regression results)

Countries	Dependent variables	Independent variables							
		GVA.AGR		PRD.AGR		AGR.EMPL		RUR.TOT	
		r	*b*	*r*	*b*	*r*	*b*	*r*	*b*
Australia	PSE ($)	0.14	57.22	−0.56**	−0.038**	0.18	72.09	0.34	83.76
	% PSE	0.66**	2.10**	−0.81**	−0.000**	0.65**	2.10**	0.78**	1.58**
	PSE/ha	0.08	0.06	−0.46*	0.000*	0.07	0.05	0.28	0.14
Canada	PSE ($)	−0.08	−228.39	−0.13	−0.022	−0.13	−230.64	−0.09	−78.49
	% PSE	0.52*	8.59*	−0.69**	−0.001**	0.57**	5.85**	0.70**	3.50**
	PSE/ha	0.04	2.33	−0.07	0.000	−0.09	−3.63	0.07	1.36
Iceland	PSE ($)	−0.45*	−7.31*	0.26	0.003	−0.53*	−15.44*	0.07	3.42
	% PSE	0.57**	1.69**	−0.31	−0.001	0.33	1.21	0.68**	6.74**
	PSE/ha	−0.03	0.03	−0.23	0.000	0.13	0.22	−0.16	0.45
Japan	PSE ($)	0.21	4 189.94	−0.52*	−0.567*	0.16	1 067.33	0.23	1 291.25
	% PSE	0.60**	6.66**	−0.59**	−0.000**	0.53*	1.81*	0.64**	2.10**
	PSE/ha	−0.23	−797.81	−0.13	0.023	−0.24	−275.82	−0.23	−227.41
Korea	PSE ($)	−0.46*	−669.54*	0.36	0.391	−0.59**	−512.63**	−0.56**	−530.53**
	% PSE	0.69**	1.77**	−0.79**	−0.001**	0.59**	0.71**	0.57**	0.97**
	PSE/ha	−0.68**	−591.17**	0.63**	0.448**	−0.73**	−355.41**	−0.73**	−407.35**
New Zealand	PSE ($)	−0.24	−45.83	−0.51*	−0.026*	0.28	36.13	0.57**	115.76**
	% PSE	−0.17	−0.82	−0.55**	−0.001**	0.35	1.17	0.61**	3.20**
	PSE/ha	−0.29	−3.24	−0.47*	0.001*	0.22	1.76	0.55**	7.50**
Norway	PSE ($)	−0.08	−36.15	0.11	0.005	−0.03	−9.47	0.01	1.04
	% PSE	0.48*	2.17*	−0.57**	−0.000**	0.49*	1.55*	0.44*	0.77*
	PSE/ha	0.34	163.14	−0.25	0.012	0.26	84.44	0.40	72.01
Switzerland	PSE ($)	0.30	321.68	−0.43	−0.146	−0.10	−122.29	−0.17	−56.27
	% PSE	0.40	3.88	−0.49*	−0.001*	0.63**	6.74**	0.49*	1.56*
	PSE/ha	−0.10	−66.26	−0.15	0.030	−0.45*	−414.84*	−0.62**	−149.24**
USA	PSE ($)	−0.36	−7 603.56	0.34	0.304	−0.14	−2 271.76	−0.13	−455.11
	% PSE	0.24	2.87	−0.30	−0.000	0.44*	3.65*	0.50*	1.04*
	PSE/ha	−0.16	−11.58	0.19	0.001	−0.14	−7.77	−0.15	−2.04
EU	PSE ($)	−0.50*	−11 214.20*	0.49*	3.199*	−0.37	−3 897.43	−0.54	−10 278.30
	% PSE	0.71**	4.79**	−0.74**	−0.001**	0.79**	2.33**	0.77**	4.41**
	PSE/ha	−0.57**	−75.41**	0.55**	0.021**	−0.40	−24.88	−0.61**	−70.61**
OECD	PSE ($)	−0.20	−5 781.79	0.08	0.777	0.15	2 102.16	−0.22	−2 039.69
	% PSE	0.78**	5.40**	−0.60**	−0.001**	0.75**	2.12**	0.85**	2.12**
	PSE/ha	0.23	8.05	−0.14	0.001	−0.12	−0.24	0.20	2.49

Notes: See Table A1 for definition of variables; na = data are not available; *r* = correlation coefficient; *b* = regression coefficient; (**) and (*) denotes significance at the 0.01 and 0.05 level, respectively

Source: Authors' computations

Table A5. Agro-food foreign trade determinants of Producer Support Estimate, 1986–2009 (simple linear regression results)

Countries	Dependent variables	Independent variables							
		TM.VAL.AGR		TX.VAL.AGR		TX.VAL.FOOD		TM.VAL.FOOD	
		r	*b*	*r*	*b*	*r*	*b*	*r*	*b*
Australia	PSE ($)	0.59**	338.33**	0.36	26.71	0.00	−0.42	−0.20	−331.30
	% PSE	0.80**	3.72**	0.75**	0.45**	0.56**	0.39**	−0.24	−3.26
	PSE/ha	0.51*	0.53*	0.27	0.04	−0.21	0.04	0.40*	1.19*
Canada	PSE ($)	−0.18	−1 018.86	−0.22	−135.67	0.48*	612.19*	0.59**	1 429.66**
	% PSE	0.65**	19.64**	0.61**	2.06**	0.39	2.66	0.15	2.00
	PSE/ha	0.06	8.56	0.05	0.66	−0.01	0.44	0.30	24.66
Iceland	PSE ($)	0.12	15.77	0.10	19.71	−0.22	−0.63	−0.85**	−24.09**
	% PSE	0.67**	17.81**	0.22	8.37	0.68**	0.40**	−0.27	−1.55
	PSE/ha	−0.46*	−3.97*	−0.12	−1.21	−0.03	0.01	0.11	0.17
Japan	PSE ($)	0.40	1 486.86	−0.11	−22 569.50	−0.15	−14 441.00	0.62**	1 828.47
	% PSE	0.62**	1.33**	−0.15	−17.16	0.22	12.22	0.76**	1.29
	PSE/ha	−0.04	−26.50	−0.25	−11 303.30	−0.41	−6861.16	0.26	100.00
Korea	PSE ($)	−0.42*	−610.99*	0.32	6 421.64	−0.53	−1 828.47	−0.29	−1 894.33
	% PSE	0.73**	1.91**	0.60**	21.24**	0.63**	3.88**	0.42*	4.83*
	PSE/ha	−0.64**	−564.21**	0.14	1 594.79	−0.73**	−1 491.26**	−0.45*	−1 783.30*
New Zealand	PSE ($)	0.46*	304.76*	0.48*	16.77*	−0.06	−3.36	−0.07	−3.29
	% PSE	0.48*	8.33*	0.51*	0.45*	−0.11	−0.15	−0.13	−0.15
	PSE/ha	0.42	18.78	0.45*	1.02*	0.06	0.26	0.04	0.16
Norway	PSE ($)	−0.53*	−687.51*	0.10	58.36	−0.16	−43.50	0.15	108.57
	% PSE	0.31	3.93	0.32	1.81	0.58**	1.55**	−0.10	−0.73
	PSE/ha	−0.36	−542.26	0.44	249.63	0.02	4.93	−0.43	−390.11
Switzerland	PSE ($)	0.09	108.26	−0.03	−87.66	0.45*	808.26*	0.25	231.95
	% PSE	0.56**	6.10**	0.59**	18.73**	−0.34	−5.77	0.56**	4.88**
	PSE/ha	−0.42	− 373.94	−0.49*	−1 300.16*	−0.07	−139.36	−0.22	−145.14
USA	PSE ($)	−0.16	−3 274.64	−0.37	−3 559.37	−0.37	−3 559.37	−0.48*	−2 491.67*
	% PSE	0.41*	5.02*	0.22	1.21	0.22	1.21	0.09	0.28
	PSE/ha	−0.31	−27.01	−0.27	−9.08	−0.27	−9.08	−0.24	−4.18
EU	PSE ($)	−0.50*	−10 673.30*	−0.46*	−17 006.00*	−0.27	−3 165.78	−0.29	−3 159.16
	% PSE	0.67**	4.26**	0.63**	7.02**	0.59**	2.12**	0.63**	2.08**
	PSE/ha	−0.57**	−69.01**	−0.53*	−108.61*	−0.37	−23.70	−0.40	−23.16
OECD	PSE ($)	−0.20	−4 145.60	−0.17	−4 551.18	−0.07	−996.01	−0.10	−1 409.95
	% PSE	0.80**	4.39**	0.76**	5.36**	0.67**	2.36**	0.72**	2.69**
	PSE/ha	0.16	4.45	0.20	6.85	0.16	2.5	0.11	1.92

Notes: See Table A1 for definition of variables; na = data are not available; *r* = correlation coefficient; *b* = regression coefficient; (**) and (*) denotes significance at the 0.01 and 0.05 level, respectively

Source: Authors' computations

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Contact address:

Aldona Zawojska, Warsaw University of Life Sciences, Department of Economics and Economic Policy, 166 Nowoursynowska Str., 02-787 Warsaw, Poland
e-mail: aldona_zawojska@sggw.pl