

Measuring Agricultural Support for Tajikistan

Parviz Khakimov¹, Ira Pawlowski¹ & P. Michael Schmitz¹

¹ Department of Agricultural and Development Policy, Justus-Liebig University Giessen, Germany

Correspondence: Parviz Khakimov, Department of Agricultural and Development Policy, Justus-Liebig University of Giessen, Senckenbergstr 3, Giessen 35390, Germany. E-mail: parviz.khakimov@zeu.uni-giessen.de; parviz_khakimov@yahoo.com

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Abstract

This paper endeavours to estimate the agricultural support for Tajikistan based on OECD Producer Support Estimate (PSE) methodology. In accordance to this methodology, the PSE and related other support measure indicators as well as the Nominal Rate of Protection (NRP) are calculated.

The results of the PSE calculation show that agricultural producers in Tajikistan are supported. The support originates mainly from transfers from consumers to producers and other transfer from consumers, while the budgetary payments to producers on national and regional level within specific commodity programmes are insignificant. The transfer from consumers to producers can be explained by higher prices consumers pay for imported commodities in comparison to world market prices due to both, higher insurance and freight costs. However, in comparison to the importance of the agricultural sector in Tajikistan's economy, the extent of agricultural support is estimated as rather low.

Keywords: Tajikistan, agricultural, support, nominal, protection, coefficient, producer, consumer

1. Introduction

Agriculture plays a crucial role in the economic growth of Tajikistan. The agricultural sector has undergone substantial changes after independence, caused, inter alia, by developments in agricultural policy. Already in 1991 international trade barriers were removed and agricultural prices were liberalized. After years of deep decline, the sector has recovered and became a backbone of the economy. In 2009, the share of agricultural production in GDP, transfers from the sector to the state budget in form of tax revenues, and the share of the sector in export (via cotton lint, vegetables and fruits) were 20, 33, and 30 percent respectively (Agency on Statistics [AS], Tajikistan in Figures, 2010).

The growth of the agricultural sector in recent years is related to land reform. Although, land in Tajikistan remains exclusively under state ownership" (Article 13 of the Constitution of the Republic of Tajikistan) and cannot be privatized, land use-rights can be transferred to individuals. Peasant (*dehkan*) farms hold 98.5 percent of the total agricultural land. As of January 2013 the numbers of peasant (*dehkan*) farms reached 71,857 and the land held by *dehkan* farms was 98.5 percent of total agricultural land (January 2013, Committee on Land, Geodesy and Cartography of the Government of the Republic of Tajikistan). Nearly 90 percent of agricultural products are produced by the private sector: 63 percent by households' subsidiary plots (except cotton), and 29 percent by peasant (*dehkan*) farms (AS, Agriculture Sector in Tajikistan, 2010).

Apart from the land reforms, there is no state incentive to further sectoral growth in Tajikistan. Agricultural workers receive the lowest wage in the economy and agricultural producers do not receive any explicit/implicit support, e.g. through concession on taxes or interest rates. The agricultural sector of Tajikistan is rather liberal - except the strategic commodity of cotton. The value chain of cotton production, processing and marketing is still highly distorted and inefficient: Tajikistan applies an export tax for cotton (10 percent). The input market for cotton producers was distorted by the monopsony position of cotton investors until 2008. The situation is changing slightly after a governmental decision to give producers a chance selling their harvest to any cotton ginners in 2009. Furthermore, in 2010, the Government of Tajikistan started introducing concessions on interest rates for agricultural producers and reduced land taxes for land allocated under cotton by 50 percent.

Assessing and quantifying policy measures and agricultural (dis)incentives allows their evaluation and comparison across time and between countries. For Tajikistan such calculations do not exist yet. This paper is going to fill this

information gap by estimating indicators of agricultural support for Tajikistan. There are three approaches internationally used to estimate agricultural support: the agricultural price distortion estimate of the World Bank, the Aggregate Measure of Support (AMS) of the World Trade Organization (WTO), and the Producer Support Estimate (PSE) of the OECD.

The World Bank approach uses indicators such as Nominal Rate of Assistance (NRA), Relative Rate of Assistance (RRA), Consumer Tax Equivalent (CTE) and Trade Bias Index (TBI), which focus mainly on government-imposed distortions that create a gap between domestic prices and border prices under free market conditions (Anderson, 2010; Anderson, 2009; Anderson & Swinnen, 2008; Anderson & Valdes, 2008; Anderson & Valenzuela, 2008; Anderson et al., 2008). One advantage of the Relative Rate of Assistance (RRA) is that this indicator considers both, agricultural and non-agricultural sectors assistance, and thus defines which country's sectoral policy regime has an anti- or pro-agricultural bias (Anderson, 2010).

The Producer Support Estimate (PSE) methodology of the OECD, developed in the early 1980s, was the conceptual basis for the Aggregate Measure of Support (AMS) in the General Agreement on Tariffs and Trade (GATT) Uruguay Round (Huang, 2010). WTO as the successor of GATT applies the AMS for monitoring the countries' commitment within WTO agreements on agriculture. Both measures, AMS and PSE, focus on the agricultural sector solely. They are related to each other but differ in purpose and measurement (Note 1). The PSE is an indicator for the annual monetary transfer of consumers and tax payers to agricultural producers measured at farm gate level. It quantifies agricultural support through (policy) interventions compared to a situation without such interventions, irrespective of form, target, and impact on agricultural production and income. Producers' support measured by OECD may originate through market transfers, transfers to producers from taxpayers, transfer to producers from consumers, other transfers from consumers, budgetary transfers (transfers to producers from taxpayers, transfers to consumers from taxpayers and price levies), market price support, payment to producer based on output and payment per ton. The AMS quantifies state monetary support in form of direct state expenditures as well as income transfers of consumers to agricultural producers due to market price distortions caused by state interventions. It includes all state interventions that are requested to be reduced in the frame of WTO agreements (amber box), like direct payments, input subsidies, market price support, and interest subsidies. Non-product specific elements (green box) are not included in the AMS thus making it less general than the PSE.

The application of the various approaches depends on the availability of data, specific advantages/constraints of the approaches and further research requirements. The main advantage of the PSE approach is its monitoring of time series and the cross-country comparability due to its consistent methodology. Thus, this paper applies the PSE methodology of the OECD to estimate support in Tajikistan's agricultural sector for the period 2000-2007.

2. Methodology and Data Sources

The OECD database on producer and consumer support (OECD, 2013) incorporates most OECD economies (Note 2) and some other economies (Note 3). PSE indicators, that are actually a set of indicators arising from each other, are used for the analysis of policy impacts, serve as input data and basis for international trade negotiations, and can serve as a tool for monitoring and evaluation of agricultural policy developments. For example, the PSE database is applied in the Policy Evaluation Partial Equilibrium Model (Tongeren, Kimura, & Le Thi, 2012) and the GTAPEM - General Equilibrium Model. The latter is a general equilibrium model that is based on the Global Trade Analysis Project (GTAP) incorporating key features of former models (OECD, 2009b).

In accordance to the PSE methodology, this study calculates the producer support and other support measure indicators as well as the Nominal Rate of Protection (NRP).

The OECD PSE methodology suggests that the list of commodities necessary for the calculation of the Market Price Support (MPS) and other support indicators should at least represent 70% of the total value of agricultural production. This analysis covers almost 90% of commodities (Note 4).

In accordance with OECD methodology, some commodity calculations do not consider the producer price at the farmgate level, but rather their passing through some processing stages (Note 5) in order to ensure the comparability of the same commodity at farmgate and border level. This is the case e.g. with sugar beet and cane, rice paddy, meat in live weight, and raw cotton. Therefore, in this study, the producer price of respective commodities is not always the one at farmgate level for unprocessed commodities (Note 6).

In this analysis the calculation of support indicators is done for the period 2000-2007. The periods 1990-1999 (Note 7) and 2008-2012 (Note 8) could not be calculated due to unavailability of certain data. The PSE and other support indicators have been calculated for each commodity as well as for the agricultural sector as a whole.

For the calculation of support indicators it is necessary to consider marketing margins (Note 9) and quality and weight adjustments. Quality adjustments were done for most of the commodities either on farmgate or border level in order to ensure comparability and thus reliable calculation. The border price (Note 10) was calculated according to the net trade situation and depending on the reliability and availability of official data.

Following data were applied in this analysis of Tajikistan's agricultural sector support: commodity balances (Note 11), producer and border prices at farmgate level, value of production, data on marketing margin (cost of processing, transportation and handling costs), data on quality and weights, exchange rates, insurance and freight costs, applied tariffs and taxes, and budgetary and other transfers on national and regional levels.

The sources of data include national statistics of the Ministry of Agriculture of the Republic of Tajikistan, the Tax Committee under the Government of the Republic of Tajikistan, the National Bank of Tajikistan and the Customs Service under the Government of the Republic of Tajikistan as well as international statistics from FAOSTAT, the United States Department of Agriculture (Foreign Agricultural Services USDA-FAS), and the Agency of Statistics of the Republic of Kazakhstan.

3. Results

This section presents the results and steps of the calculated agricultural support indicators. Detailed tables of results (total, producer and consumer supports, other support indicators as well as Nominal Rate of Protection) are presented in the appendix (A1-A18).

3.1 Producer Support Estimate and Other Support Indicators

The PSE provides information on agricultural support through various (policy) interventions while the issue of trade distortions is not addressed. Policy-related transfers, for example decoupled payments to farmers (i.e. the payment to producers that are not related to production of commodities), are likely to have much less effect on supply and demand of agricultural commodities even if such payments are not in place (OECD, PSE Manual, 2010b). Sometimes the policy regarding the sector is changed (Note 12) while the value of PSE is not. In this case, in order to detect the change in policy, each component of PSE should be examined.

The PSE component in accordance to OECD's 2007 revision are: (a) Support based on commodity output that includes MPS and payments based on output; (b) payments based on input use; (c) Payments based on current Area (A), Animal Numbers (AN), Receipts (R) or Income (I); (d) Payments based on non-current A/AN/R/I, production required; (e) Payments based on non-current A/AN/R/I, production not required; (f) Payments based on non-commodity criteria; (g) miscellaneous payments.

From the above listed PSE components, only MPS, which is one component of support based on commodity output, indicates the transfers from consumers and taxpayers to producers, while the rest of components indicate the transfers from the state budget to producers of agricultural commodities. On the other hand, it might be misleading to say that a change in the value of PSE is necessarily related to a change in policy. For instance, the value of support might change under changing world market conditions and exchange rate changes which might lead to a change in the value of PSE regardless of agricultural policy changes over time.

The PSE alongside budgetary payments also include transfers from taxpayers to producers and other transfers which do not require actual monetary disbursement from state budgets at the national and regional levels. The transfer from taxpayers to producers and other transfers are financed by domestic consumers who purchase the agricultural commodities at a price above the international level (OECD, PSE Manual, 2010b).

3.2 Nominal Protection Coefficient and Nominal Rate of Protection

The OECD's producer Nominal Protection Coefficient (pNPC) is the ratio between the Producer Price (PP) and the Border Price (BP), including to the former the ratio between the payments per ton on current output (PO_i) and quantity of produced commodity (QP_i), both measured at farmgate level (OECD, 2000).

$$pNPC_i = \frac{(PP_i + \frac{PO_i}{QP_i})}{BP_i} = \frac{PP_i}{BP_i} + \frac{PO_i}{BP_i QP_i} \quad (1)$$

The Nominal Rate of Protection (NRP) is the most frequently used measure of protection because of its relatively limited data requirements and its ability to capture most of the market distortion effects (Thomson & Metz, 1998). The producer NRP is defined as the ratio between the Market Price Differential (MPD) and the Border Price (Equation 2).

$$pNRP_i = \frac{MPD_i}{BP_i} = \frac{(PP_i - RP_i)}{BP_i} = \frac{PP_i}{BP_i} - 1 \quad (2)$$

The producer NRP can be derived from the producer NPC:

$$pNRP_i = \left(pNPC_i - \left(\frac{PO_i}{BP_i} \right) - 1 \right) * 100 \quad (3)$$

The consumer NRP (cNRP) simply equals cNPC minus unity because the latter is simply the ratio between the Producer Price and Border Price, both measured at farmgate level.

$$cNRP_i = (cNPC_i - 1) * 100 \quad (4)$$

It should be noted that the producer and consumer NPC are coefficients, while the producer and consumer NRPs are ratios.

3.3 Calculation of Agricultural Support Indicators for Various Commodities

The respective sub-sections provide information on the steps of calculation of the agricultural support indicators of various commodities.

3.3.1 Wheat, Maize, and Other Grains

“Wheat”. The calculation of PSE for wheat requires certain adjustments beforehand: first, with regard to the quality of production and second, referring to marketing and transport margins.

Quality adjustments are necessary to compare domestically produced and imported wheat. Wheat produced in Kazakhstan is of significantly higher quality than that produced in Tajikistan. Kazakhstan produces both hard and soft wheat (Agency of Statistics of Republic of Kazakhstan, 2010). Tajikistan imports mainly hard wheat from Kazakhstan which is not comparable to the soft wheat that is produced in Tajikistan. In order to ensure a comparison of “like with like” it is assumed that the quality of soft wheat is the same in both countries. The quality adjustment was done as follows: the difference between the producer price for hard and soft wheat in Kazakhstan is calculated (almost in average 20 percent for the observed period). Therefore, the border price for hard wheat (BP_h) is equal to unity minus the price differential between the border prices of hard and soft wheat (ΔP) multiplied by the border price for soft wheat (BP_s).

$$BP_h = (1 - \Delta P) * BP_s \quad (5)$$

Such quality adjustment ensures that a homogenous product is compared at farmgate and border levels. As a second option, it is theoretically possible to adjust the quality of soft wheat, i.e. the price of domestically-produced soft wheat to the border price of hard wheat. In this case, the value of domestic (soft) wheat production will increase later in the calculation. An increase of the value of production will further lead to an increased gross value of agricultural commodities in total and thus to an increased total value of production of MPS commodities. Due to this calculation dilemma of the second approach, the first option was chosen, i.e. imported hard wheat was adjusted to domestic soft wheat and not vice versa.

Both cases (increased and decreased producer and border prices due to quality adjustments) lead to adjustments in the value of: MPD; MPS; market transfer (transfer to producers from consumers, other transfers from consumers); budgetary transfer (transfer to producers from taxpayers); pNPC and cNPC; percentage of pNPC and cNPC; PSE and consumer support estimates (CSE); producer and consumer Nominal Assistance Coefficient (NAC); producer Single Commodity Transfer (SCT); and percentage SCT.

Besides the quality adjustment, marketing and transport margins also have to be considered in order to ensure the comparability of border and producer prices. Transportation and handling costs between the border and the domestic wholesale market (T_1) should be added to the CIF price in the case of an import situation (in the case of an export situation these costs have to be subtracted from the FOB price). On the next level, the handling and transportation costs between the wholesale market and the farmgate (T_2) are subtracted (in both cases import-CIF and export-FOB). And finally, the costs of possible processing (S) of the raw farm product into the final imported/exported products are subtracted.

In the case of wheat, of which Tajikistan is a net importer, and as far as the data on handling and transportation costs (T_1 and T_2) are not available, it is logically assumed that they cancel each other out. But in the case of an export situation, all transportation costs have to be subtracted (OECD, PSE Manual, 2010b). The costs of processing a farm product (S) into the final imported (exported) good must always be taken into account and deducted from the CIF price.

“Maize and other grains”. There is an insignificant production level of maize and other grains (barley, oats and rye) in Tajikistan and most of it is used as feed. In order to calculate the PSE for these crops, the Ukrainian border

price was taken as a border (reference) price because Ukraine is the main exporter of these crops to Tajikistan. In order to obtain the border (reference) price, the FOB price in Ukraine (FOB_{other}) for these products are taken as a Tajik border price with insurance and freight costs (IF) added.

In order to ensure the reliability of the calculation of the PSE for other grains, which include barley, oats and rye, the weighted average producer and border prices for the single grain crops were taken, instead of the simple arithmetical mean. Also, the costs for insurance and freight (IF) were weighted. This is due to significant differences in transit costs through the territory of Uzbekistan depending on the final destination in Tajikistan – the north part (Sughd region) or the southern part (Khatlon region and the capital city of Dushanbe). For example, transportation costs are half when delivered to the North as to the South (Chabot & Tondel, 2011). Furthermore, depending on the use of maize and other grains (for human consumption or feed), the IF costs are weighted by the population and number of livestock in each region. Altogether, the weighted average insurance and freight costs for delivery to the North and to the rest of Tajikistan (South and capital city Dushanbe) are calculated as shown in Equation 6:

$$IF_c = (Sh_{pl}^n * IF_n) + (Sh_{pl}^r * IF_r) \quad (6)$$

where, Sh_{pl}^n = share of population and livestock in the northern part of the country, Sh_{pl}^r = share of population and livestock in the rest of the country, IF_c = country-weighted average insurance and freight cost, IF_n = insurance and freight cost for delivery to the northern part of the country, IF_r = insurance and freight cost for delivery to the rest of the country.

Finally, the producer and border prices for other grains are derived from the weighted producer and border prices of barley, oats and rye respectively (Equations 7 and 8).

$$PP_{og} = \frac{(B_{og}^% * PP_b) + (O_{og}^% * PP_o) + (R_{og}^% * PP_r)}{100\%} \quad (7)$$

$$BP_{og} = \frac{(B_{og}^% * BP_b) + (O_{og}^% * BP_o) + (R_{og}^% * BP_r)}{100\%} \quad (8)$$

where, PP_{og} = producer price for other grains, BP_{og} = border price for other grains, $B_{og}^%$ = share of Barley in Other grains, $O_{og}^%$ = share of Oats in Other grains, $R_{og}^%$ = share of Rye in Other grains, PP_b , PP_o , PP_r , BP_b , BP_o , BP_r = producer and border prices for barley, oats and rye respectively.

The average weight of barley, rye and oats in other grains for the period for 2000-2007 were 97.2, 1.0 and 1.8 percent respectively. It should be noted that the weight of each of these crops in other grains fluctuates significantly each year, but their own calculation in each year was taken as a weight and used for share of each crop.

3.3.2 Cotton

Tajikistan is a net exporter of cotton. Raw cotton passes through stages of processing before final delivery to consumers; consequently, producer prices should be compared at the refined level. The refined level for cotton is reached after processing of raw cotton in a gin and separating cottonseed from cotton lint. Therefore, the estimate of MPS at this analysis refers to cotton lint at the gin and the border.

The indirect producer price (PP_{cl}) for cotton lint at the farmgate level is derived from the border price. PP was calculated based on the deduction of all taxes from the border FOB price (FOB_{cl}) and handling and transportation costs (T_1 & T_2), as shown in Equation 9. Processing costs (S) were not deducted because the producer price and the border price are shown at the same processing stage, in the form of cotton lint.

$$PP_{cl} = FOB_{cl} - T_1 - T_2 - TR_{TUGE} - VAT - C_t \quad (9)$$

where, TR_{TUGE} = tariff rate of Tajik Universal Goods Exchange (15 percent), VAT = Value added tax (until 2009 the rate was 20 percent, later 18 percent), C_t = Customs Tax (10 percent applied to exports of cotton lint).

3.3.3 Rice

The commodity rice was considered in the analysis as milled rice. Some weight adjustment has been done in order to compare milled rice at farmgate and border levels. The total production of milled rice (QP_{rme}) is derived by multiplying the production of paddy rice (QP_{rpe}) with the extraction rate (0.66) of paddy to milled rice.

The weighted average producer price at farm gate level for milled rice (PP_{rme}) is obtained by dividing the weighted average producer price of paddy rice at farm gate level (PP_{rpe}) by extraction rate. The same approach is used for deriving the border price for milled rice equivalent.

The value of production of milled rice equivalent (VP_{rme}) can be expressed as:

$$VP_{mre} = (QP_{rpe} * ER) * \left(\frac{PP_{rpe}}{ER}\right) = QP_{mre} * PP_{rme} = VP_{rpe} * ER \quad (10)$$

where, QP_{rpe} = quantity of produced paddy rice; ER = extraction rate; PP_{rpe} = producer price of paddy rice at farm gate level; QP_{rme} = quantity of produced of milled rice; VP_{rpe} = value of production of paddy rice equivalent.

The processing costs of transforming paddy rice into milled rice are not taken into account at farmgate and border levels, assuming that they cancel each other out.

Due to the unreliability of border prices for imported rice from China (the main rice exporter to Tajikistan), the Chinese producer price for rice paddy is taken as a reference border price and added to IF costs for delivery to the Tajik border.

3.3.4 Fruits and Vegetables

Potatoes, onions, tomatoes, lemons, grapes and apples produced in Tajikistan are internationally traded commodities. Grapes and lemons are net export commodities of Tajikistan. Depending on the season, onions, tomatoes and apples are either export or import commodities, but for this analysis, Tajikistan is considered as a net exporter because the exports prevail over imports most of the year. The import of potatoes exceeds its exports, but it should be noted that potatoes are also used as feed. Tajikistan is self-sufficient with its potato production and on average during the period 2000-2007 almost 15 percent of domestically produced potatoes were used as feed, while for the same period the quantity of imports was less than the quantity of feed used. The import of potatoes takes place during the winter season with Pakistan being the main country of origin.

One of the challenges of calculation is the unreliability and consistent underestimation of the border price for potatoes as there is significant illegal trade and available data are erratic. Recorded CIF prices are often less than the producer prices in the country of origin (Pakistan, Russia) which is not realistic (Note 13). In order to calculate the border price for potatoes despite these problems, the farmgate price in Pakistan was taken plus insurance and freight costs to the Tajik border.

Similar data problems exist with onions, lemons, tomatoes, grapes and apples where the Tajik producer price (at farmgate level) is higher than the border price for these exported commodities, although no export subsidy policy is in place in Tajikistan.

In order to define the border price for the exported commodities (onions, tomatoes, lemons, grapes and apples) the MPD was calculated. The MPD for these commodities is equal to the producer price (PP_i) multiplied by the ratio of average *ad valorem* tariffs (tr_i) for commodities and unity plus *ad valorem* tariffs.

$$MPD_i = PP_i * \frac{tr_i}{1+tr_i} \quad (11)$$

Then the border reference price is calculated as the producer price plus market price differential.

It should be noted that there is no input support, neither governmental payments based on output to producers nor export subsidies at the country or regional level.

3.3.5 Livestock Commodities

“Milk”. Based on the former OECD methodology, until 2004 the border reference price for milk for all countries was derived from the farmgate milk price in New Zealand, adjusted for milkfat content and transportation costs. The calculation of protection indicators for milk is complex because of two reasons: first, raw milk is not traded internationally, and second, the valuable component of raw milk - the milkfat - varies. Therefore, the border reference price for raw milk in 2007, in accordance with the new OECD methodology, was derived implicitly based on trade prices of skimmed milk powder (SMP) and butter (OECD, 2010b). The quality adjustment for milk was done for imported and domestically produced milk components, taking into account such components as milkfat content in butter, SMP, and raw milk, as well as the non-fat solids content of butter, SMP, and raw milk. As the reference price for butter (82%) and SMP, the CIF price in Northern Europe was taken (OECD, 2010a). IF costs were added for delivery to the Tajik border. The milk fat content in butter (CIF) refers to data from the University of Guelph, Institute of Dairy Science and Technology. For the calculation of the implicit border price of

raw milk, Western data on non-fat solids content of raw milk (USAID, 2003; Salathe & Price, 1992), non-fat solids content of butter (USAID, 2003), milkfat content of SMP, and milkfat content of raw milk (FAO, 2004) are used due to the unavailability of official Tajik statistics. Based on these data, the implicit reference border price for raw milk is calculated stepwise, derived from the price of the two milk components milkfat and non-fat solids.

The implicit border price of milkfat (X) is defined by the border price of butter and SMP and calculated as follows:

$$X = \frac{(dBP_s - cBP_b)}{(ad - bc)} \quad (12)$$

where a = milkfat content of butter, b = non-fat solids content of butter, c = milkfat content in SMP, d = non-fat solids content of SMP, BP_b = butter border price and BP_s = SMP border price.

The implicit border price of non-fat solids (Y) is also defined by the border price of butter and SMP:

$$Y = \frac{(aBP_s - bBP_b)}{(ad - bc)} \quad (13)$$

Finally, the implicit reference border price of raw milk (BP_{im}) is obtained from the calculated reference border prices of butter and SMP (Equation 14):

$$BP_{im} = \alpha BP_b + \beta BP_s \quad (14)$$

where α = Share of butter price in milk price, β = Share of SMP price in milk price.

As a next step, the processing margin is calculated by subtracting the producer price for manufacturing quality milk from the implicit wholesale price of raw milk in the domestic market. The marketing margin (MM) of butter and SMP can be expressed and calculated in two ways (Equations 15 and 16):

$$MM = (\alpha WP_b + \beta WP_s) \quad (15)$$

$$MM = (\alpha WP_b + \beta WP_s) - C \quad (16)$$

where, WP_b = wholesale price of butter in the domestic market, WP_s = wholesale price of SMP in the domestic market, PP_m = producer price of milk, C = average processing margin of butter and SMP in four major exporters (New Zealand, the European Union, Australia and the United States of America).

The share of butter price in milk price (α) and the share of SMP price in milk price (β) is defined and calculated as follows:

$$\alpha = \frac{de - bf}{ad - bc} \quad (17)$$

$$\beta = \frac{(af - ce)}{(ad - bc)} \quad (18)$$

In the case of unavailability of data on the wholesale price of butter and SMP in the domestic market (like Tajikistan) prices can be derived alternatively in three ways. The first way is by using technical coefficients: the production of 1 ton of (82% fat) butter requires 8780 liters of milk (4%); the production of 1 ton of (0.5% fat) Skimmed Milk Powder (SMP) requires 20,850 liters of 4% fat milk (FAO, 2009). The producer price for raw milk is multiplied by the required liters of milk for producing butter and SMP, and then added by the domestic processing costs, interest rates of processors, and transportation costs to deliver to the wholesale market. Such an approach can be used if there is no implicit or explicit price support of milk producers and processors. The second way is to use the wholesale price for butter and SMP of the main importing and exporting countries (OECD, Agricultural Outlook, 2010a) and to complement it with IF costs for delivery to the country border, taxes, and costs of delivery from the border to domestic wholesale markets. The third way, if consumer prices (AS, Prices in Tajikistan, 2010) are available, is to subtract the percentage of the retail price (converted to an absolute value) from the consumer price.

After the implicit reference border price of raw milk has been calculated, the further steps of calculating the PSE for milk are the same as for all MPS commodities.

“Beef and veal”. The producer price of boneless beef (PP_{bb}) is defined as a ratio of the producer price for beef in live animal weight equivalent (PP_{bl}) and a weight-adjustment coefficient (WA_{bb}) (tons of boneless beef obtained from one ton of live animal).

The reference border price of boneless beef (RP_{bl}) is equal to the difference between the border price (BP_{bb}) and marketing margin (MM_{bb}) multiplied by a quality adjustment (QA_{bb}) for boneless beef.

Due to unreliable official data of the Customs Committee of Tajikistan, the border price (CIF) for the period 2003-2007 was estimated by comparing the domestic consumer and producer prices with the producer price in India (Note 14). So far, as in the calculation of the producer price for boneless beef, the marketing margin (MM) is not taken into account, it is logically assumed that MM for the reference border price is zero, while the quality adjustment coefficient is equal to unity. In this case, the reference price is simply equal to the border price for boneless beef.

“Sheep and Goats”. Sheep and goat meat produced in Tajikistan is not officially traded in international markets and the country is self-sufficient. In order to calculate the support indicators, the New Zealand producer price (FG_{other}) was taken as a border price, added to insurance and freight costs (IF) for delivery to the Tajik border.

“Poultry and Eggs”. During the period 2000-2007, on average, only 12 percent of all consumed poultry meat was produced in Tajikistan, the rest was imported. New Zealand’s producer price was taken as a border price and IF costs added.

The majority of egg imports comes from Iran (90% of total imported eggs) and to a lesser degree from India, Pakistan and China. As with beef, an official CIF price can be found; however it does not reflect the real price and is underestimated. For this reason the real border price was calculated based on the comparison of producer prices (at farmgate) in the aforementioned countries. For 2000-2002 the producer price in India and for 2003-2007 the Iranian producer price was taken as a farmgate price respectively.

3.4 Excess Feed Cost

Wheat, oats, maize, barley, millet, rye, sorghum, cotton and sunflower seedcakes, rape and mustard seed, potatoes, beans, apples, bran and other vegetables are mainly used as feed in Tajikistan.

Excess feed cost (EFC) is a supplementary cost resulting from MPS on quantities of crops domestically produced and consumed as feed by livestock producers (OECD, Glossary of Agricultural terms, 2000). Its estimation is necessary in order to eliminate double counting of price transfers in the aggregation of MPS across commodities when deriving a national level of MPS (OECD, PSE Manual, 2010b). In order to avoid double-counting, the EFC should be deducted from PSE for livestock and CSE for commodities that are used as feed. EFC calculation, therefore, allows calculating the quantity of domestic feed crops that are used for beef and veal, pork, sheep and goat, poultry and egg production. If livestock producers pay lower prices for feed crops (in this case EFC is negative), it leads to a decrease of producer prices for livestock commodities and *vice versa*. In this case, consumers as well pay a lower price for livestock commodities, and conversely. All these would be true in the case of an open and perfectly competitive economy. On the basis of all the foregoing, it can be stated that the EFC is an important component of agricultural support estimates.

Most feed crops are produced domestically and the share of imported feed during the observed periods is, on average, 0.1 percent. EFC is not calculated for imported feed crops such as molasses, soybean cake and other cereals.

In order to estimate the EFC, the quantity of consumed feed crops was defined and the share of each feed commodity in total feed was calculated. The share of all livestock (sheep and goats, cattle beef, dairy cows, horses, yaks and poultry) in total feed demand is calculated. Half of the cattle in Tajikistan are calves, so that the equivalent used for them (0.6) is less than that for full-grown bulls or dairy cows (1.0). Required (oat) feed is based on 2.12 tons of oats required for feeding one animal per year (Sedik, 2009). Based on such assumption, the required oat feed is 1.27 tons per year per calf. The share of feed consumed by sheep and goats is equal to 26 percent of total feed consumption, the share by beef cattle and dairy cows are 24 and 42 percent respectively, horses and yaks consume 5 percent, while poultry consume the remaining 3 percent of domestically produced feed. The shares of each feed within total feed are defined. In the next step, total feed is proportionally distributed among the different livestock for the years under question.

Excess Feed Cost (EFC_i) is equal to market price differential (MPD_j) multiplied by the quantity of domestically produced and consumed feed (QC_j^i).

For most crops (feed and non-feed) the producer price in Tajikistan is almost two times higher than the border price (FOB) in most neighboring exporter countries and the producer prices in those countries. When feed from potential third exporter countries is delivered to the Tajik border the actual border price exceeds the producer price due to high insurance and freight costs and the relatively high transportation costs for transit through Uzbek territory. Thus, the import of feed is not profitable, despite the relatively high producer prices in Tajikistan.

4. Discussion

Based on the study results presented, this part will pay particular attention to three key findings on measuring agricultural support in Tajikistan: first, the factors influencing the value of PSE and other support indicators; second, favoured form of land use (mainly cereals and cotton) and livestock production; third, the reliability of official data and its handling.

First, there are several factors which influence the value of agricultural support. A change in producer or border prices leads to a price gap between them, hence to fluctuation of MPS, and consequently PSE, CSE and other support indicators. Also, such fluctuation can be due to the appreciation (or depreciation) of the national currency (in the case of a trading situation). Those factors occur for most of the countries but there are some other specific factors which affect predominantly landlocked countries such as Tajikistan, namely higher transportation costs of commodities. For example, the cost of delivering wheat and other grains from Kazakhstan to the Tajik border through the territory of Uzbekistan is significantly higher than delivering the same commodities to the Afghan or Iranian border, although the distance from Kazakhstan to the latter countries is longer (Chabot & Tondel, 2011). The border price for exported wheat at the Kazakh border is at least twice the border price for imported Kazakh wheat at the Tajik border. The reasons are the very high insurance and freight costs. The same is true for other traded agricultural commodities which pass through Uzbek territory.

Second: the decision on land use - wheat and cereal production versus cotton cultivation. In Tajikistan, the production of wheat is increasing significantly with a producer price almost double the world market price due to lower yields and input costs for irrigation. The higher producer price in domestic markets is theoretically a good incentive for production of wheat and other cereals, but not for consumers. Thus, most of the wheat production is not sold by farmers in the domestic market, instead being used for self-consumption and feed. Therefore, the producers and consumers of Tajik wheat and cereals are the farmers themselves. Interpreting the situation from such a point of view one sees that land is used with less efficiency. The higher producer price for wheat and other cereals is mainly related to lower yields and the necessity of irrigation due to climatic conditions of the country. Cereal prices influence the livestock prices. As the analysis shows, the higher price for livestock commodities in Tajikistan is mainly related to higher prices for feed crops but also to an annually growing number of livestock, while the area allocated to forage and feed crops has been decreasing or stagnating since 2011. There is no explicit governmental support for feed producers in Tajikistan. Furthermore, export or import of feed is not hampered by any Tajik measures.

The export of cotton lint is one of the most important sources of earnings of foreign exchange in the country. However, the revenues as well as the PSE fluctuate depending on the world market price for cotton. Additionally, the cotton market in Tajikistan is quite complex and often non-transparent. Until 2008, it had been a monopolized system dominated by so-called “investors” and the government who prevented competition and who still controls the export. The result was an inflation of input prices and relatively lower output prices in comparison to more competitive cotton markets like in neighbouring Kyrgyzstan. Farmers have not been interested in cultivating cotton. Even after the official removal of this monopolized system, farmers’ motivation for growing cotton has not increased. Farmers are free now to sell raw cotton to any gin but the gins still do not offer prices as high as in former times, due to fluctuating world market prices and high state tariffs and taxes (cumulatively almost 45%). The situation might change if all tariffs and taxes were removed which will serve as incentive to expand production.

Third, the main challenge in the analysis is the reliability of official data. The quality of any calculation is only as good as the quality of its data. Estimating the agricultural support in Tajikistan is a big challenge because of the data availability and reliability problem. Such data problems in transition countries are well-known and every researcher has to find a way of coping with it. This example of Tajikistan presents specific solutions for particular problems.

Border price inconsistencies were found for several internationally traded commodities. The volume of imported commodities was assessed as reliable but the CIF and FOB prices are unreliable and consistently underestimated. Official border prices (FOB or CIF) were significantly lower than the real border price (cotton and wheat are exemption) by several times or at least by 30-50%, depending on the respective commodity. This conclusion was made by comparing domestic wholesale prices, consumer prices, and producer prices for both, domestically produced and imported commodities. Therefore, the border prices FOB of trading partners of Tajikistan were taken as a reference price and adjusted to the border level.

Data analysis reveals that the prices of wheat and cotton lint reflect the real (not underestimated) border prices (respectively CIF and FOB). For maize and other grains this is not the case, as those commodities were not

internationally traded by Tajikistan in the observed time period or the volume of imports are insignificant in some years. For all other commodities of the analysis, the border price did not indicate the real price and was underestimated. This effect can be explained by misreporting of trade data by exporters and importers of agricultural commodities in order to avoid tax payments as well as by misinformation from the Customs Service under the Government of the Republic of Tajikistan that benefit from bribes. Such a situation can be observed not only for agricultural commodities but also for other commodities, where the corruption scheme is even more extensive than in agriculture.

Based on the aforementioned, it can be concluded and guesstimated that total imports outweigh exports, on average in 2007-2011, not by 2.5 times as indicated in official statistics but should exceed it by 3.5 to 4 times. The negative trade balance for the economy of Tajikistan during the last 6 years has been compensated by labour migrant remittances that have become the main source of foreign earnings. This enables the National Bank of Tajikistan to keep the official and market exchange rate at a stable level, despite the negative trade balance. Except remittances, there are nearly no other sources of financing the trade deficit, which might lead in the end to a depreciation of the national currency. This could further lead to differences between the official and market exchange rates.

5. Conclusion

The results of the PSE calculation using the OECD methodology reveal that agricultural producers in Tajikistan are supported in a certain way. Calculation of PSE and other related support indicators show that producers mainly receive support in the form of transfers from consumers to producers, transfers to producers from taxpayers, and other transfers from consumers while the budgetary payments to producers on country and regional levels within specific commodity programmes is insignificant. The transfer from consumers to producers can be explained by higher prices that consumers pay for imported commodities in comparison to world market prices due to both, higher insurance and freight costs.

The main challenge of the calculation of agricultural support indicators for Tajikistan is not related to the lack of border price data in general, but often to its unreliability. Recorded border prices were significantly lower than the real border prices for many internationally traded commodities (with the exception of cotton and wheat). The main reason is the deliberate report of incorrect trade values by exporters and importers of agricultural commodities.

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Notes

Note 1. The main differences between these two approaches are: WTO “Green Box” differ from General Services Support Estimate (GSSE) of OECD; WTO AMS differ from PSE of OECD; WTO calculates Market Price Support (MPS) only if “administered price” is in place, using the gap between fixed external reference price (average f.o.b. or c.i.f. price for 1986-1988) and applied producer administered price by multiplying of the latter by the quantity of production eligible to receive the applied administered price; while OECD PSE calculates MPS in any case and compares producer and border price data in the same single year, thus, the price gap calculation techniques differ; WTO calculation of MPS does not consider price levies, nor transfers from consumers and taxpayers to producers; WTO commodity specific AMS will be exempted from total AMS if it is below *de minimis*. Despite methodological differences on measuring agricultural support, depending on research needs, both approaches may serve complementary to each other.

Note 2. Australia, Canada, Chile, European Union, Iceland, Israel, Japan, Korea, Mexico, New Zealand, Norway, Switzerland, Turkey, and United States.

Note 3. Brazil, China, Indonesia, Kazakhstan, Russia, South Africa, and Ukraine.

Note 4. See the Figures in Appendix A1. These commodities are in detail: *wheat, maize, other grains (barley, rye and oats), potatoes, tomatoes, grapes, lemons, apples, onions, milk, beef and veal, sheep and goats, poultry, eggs, cotton, cotton-oil, rice.*

Note 5. In this case the “consumer” is the one who purchases commodities from the processor.

Note 6. In the case of milk, an implicit border price is calculated and compared with the same at farmgate level (producer price) because raw milk is not an internationally traded commodity.

Note 7. There is no data on support of the sector within the state budget on different levels within this period.

Note 8. There is no data on commodity balance sheets and producer prices of commodities under question.

Note 9. Representing the costs of processing, transportation, and handling.

Note 10. This analysis distinguishes between two border prices: real and actual border price. The real border price originates from the comparison of prices based on the source of trade origin and whether a commodity is imported or exported. For example, if Tajikistan is a net importer, the real border price is obtained by taking the prices of the country of origin (which are the export and producer prices in the country of origin) and adding insurance and freight costs (IF) for delivery to the Tajik border. If Tajikistan is a net exporter, the Tajik producer price is taken, added are applied taxes and tariffs which are in place, and deducted are transportation costs from farmgate to wholesalers and from wholesalers to the border. Under the actual border price this analysis understands that data available from official statistics on border prices are often (except for cotton and wheat) underestimated and unreliable.

Note 11. The commodity balance includes: production quantity, import and export quantity, stock variation, domestic supply quantity, feed, seed, waste, processed, consumption, and other utilities.

Note 12. Increase or decrease of farmer’s support or taxation.

Note 13. For example, in 2007 Pakistan was the country of origin for 80% of imported potatoes to Tajikistan. In accordance with official data of the Customs Service under the Government of Tajikistan, the CIF price for imported potatoes from Pakistan to the Tajik border was 166 USD per ton, while the producer price in Pakistan was 189 USD. And the CIF price at the Tajik border for imported potatoes from Russia was recorded as 136 USD, while the producer price in the same year in Russia was 248 USD.

Note 14. One example for unreliable official data: The import price for Indian boneless frozen beef at the Tajik border in 2007 was stated at 390 USD/t while the wholesale price for imported boneless frozen beef was 3000 USD/t. Assuming a border price of 390 USD/t, adding a 10% customs tax for imported beef and a 20% VAT, plus 2% transportation costs from the border to the wholesale market, results in a border price of 507 USD which is 6 times less than the wholesale price for imported boneless frozen beef! Therefore, the stated import price is not reliable.

Annex A: Agricultural Support Indicators

Table A1. Total Support Estimate and Aggregate Single Commodity Transfers

	2000	2001	2002	2003	2004	2005	2006	2007
Total value of production (USD mn)	416	526	582	763	923	1065	1317	1174
of which, share of MPS commodities (%)	95.7	92.8	94.2	93.8	93.7	92.4	90.2	85.8
Total value of production MPS commodities (USD mn)	398	488	549	715	864	984	1187	1008
Total value of consumption (USD mn)	425	539	472	574	727	845	1033	905
of which, MPS commodities (USD mn)	408	501	438	526	669	764	904	739
Total Producer Support Estimate (USD mn)	-8	11	14	17	15	84	152	129
Total Support Estimate (%)	-0.9	1.0	1.1	1.1	0.7	3.7	5.4	-0.9
Percentage PSE	2.0	2.0	-2.3	-2.2	-1.6	7.9	11.5	11.0
Producer NAC (ratio)	1.02	1.02	0.98	0.98	0.98	1.09	1.13	1.12
Excess feed cost (USD mn)	-1.8	-0.8	0.7	6.4	-1.4	22.0	29.5	-13.0
Percentage CSE (%)	-24.3	-28.0	-29.2	-25.8	-23.0	-29.3	-27.9	-19.6
Consumer NAC (ratio)	0.3	0.4	0.4	0.4	0.3	0.4	0.4	0.3
Total Support Estimate (USD mn)	-8.4	10.8	13.6	16.6	14.9	84.7	153.0	131.0
Transfers from consumers (USD mn)	-102	-150	-139	-155	-166	-270	-317	-164
Transfers from taxpayers (USD mn)	-52.2	-35.9	-52.6	-69.2	-48.6	-42.7	-36.0	-6.9
Budget revenues (-) (USD mn)	-57.7	-104	-72.5	-68.8	-102	-143	-128	-26.4
Total Support Estimate (%)	-0.9	1.0	1.1	1.1	0.7	3.7	5.4	3.5
Gross Domestic Product (USD mn)	976	1081	1221	1556	2076	2312	2830	3744
Total Single Commodity Transfers (USD mn)	-13.1	1.4	0.2	-4.3	-12.7	46	137	74
SCT (%)	-3.2	0.3	0.03	-0.6	-1.4	4.5	10.7	6.7
Share in Total PSE (%)	156	13	1	-26	-87	55	90	57

Source: Author's calculations.

Table A2. Wheat

WHEAT	2000	2001	2002	2003	2004	2005	2006	2007
Excess feed cost (USD mn)	0	0	0	0	0	11.1	15.8	5.8
Producer NPC (ratio)	2.0	2.3	2.2	2.0	2.0	1.9	1.8	1.1
Producer NRP (%)	100.1	130	120	99.8	99.5	90.5	80.6	10.1
Consumer Support Estimate (USD mn)	-89.0	-114.8	-80.1	-69.3	-100.7	-113.5	-105.8	-16.9
Percentage CSE (%)	-49.6	-57.2	-55.3	-49.6	-49.8	-51.6	-50.6	-11.5
Consumer NPC (ratio)	1.99	2.33	2.24	1.99	1.99	2.31	2.39	1.18
Consumer NAC (ratio)	1.99	2.33	2.24	1.99	1.99	2.07	2.02	1.13
Consumer NRP (%)	99	133	124	99	99	107	102	13
PSE (USD mn)	36.2	47.2	43.2	45.3	60.4	58.4	56.9	9.0
PSE (%)	50	57	55	50	50	48	46	10
Producer NAC (ratio)	2.0	2.3	2.2	2.05	2.0	1.9	1.8	1.1
Producer Single Commodity Transfers (USD mn)	36.2	47.2	43.2	45.3	60.4	58.4	56.9	9.0
SCT (%)	49.6	57.2	55.3	49.9	49.9	47.8	45.7	10.2

Source: Author's calculations.

Table A3. Maize

MAIZE	2000	2001	2002	2003	2004	2005	2006	2007
Excess feed cost (USD mn)	-0.7	-0.03	-0.005	-0.1	-0.3	2.7	-0.3	-8.9
Producer NPC (ratio)	0.72	0.73	0.57	0.57	0.91	1.18	0.92	0.49
Producer NRP (%)	-28.0	-27.0	-43.0	-43.0	-9.0	18.0	-8.0	-51.0
Consumer Support Estimate (USD mn)	1.2	5.5	3.6	6.6	1.2	1.0	1.2	-1.0
CSE (%)	32.0	36.6	71.8	73.9	7.8	8.5	6.4	-12.5
Consumer NPC (ratio)	0.67	0.73	0.58	0.57	0.91	1.18	0.92	0.50
Consumer NRP (%)	-33	-27	-42	-43	-9	18	-8	-50
Consumer NAC (ratio)	0.76	0.73	0.58	0.58	0.93	0.92	0.94	1.14
PSE (USD mn)	-1.5	-1.6	-3.7	-6.9	-1.6	1.9	-1.6	-8.4
PSE (%)	-34.0	-36.1	-71.8	-73.9	-8.2	6.1	-6.8	-49.1
Producer NAC (ratio)	0.71	0.73	0.60	0.64	0.9	1.1	0.9	0.7
Producer Single Commodity Transfers (USD mn)	-1.5	-1.61	-3.7	-6.9	-1.6	1.9	-1.63	-8.4
SCT (%)	-34.0	-36.1	-71.8	-73.9	-8.2	6.1	-6.8	-49.1

Source: Author's calculations.

Table A4. Other Grains (rye, barley, oats)

OTHER GRAINS (RYE, BARLEY, OATS)	2000	2001	2002	2003	2004	2005	2006	2007
Excess feed cost (USD mn)	-0.04	-0.003	-0.10	-0.1	-0.01	-0.3	-0.2	-2.6
Producer NPC (ratio)	0.8	1.0	0.7	0.7	1.0	0.8	1.0	0.5
Producer NRP (%)	-20	0	-30	-30	0	-20	0	-50
Consumer Support Estimate (USD mn)	0.5	0.0	1.6	2.4	0.3	0.6	0.3	2.5
CSE (%)	26	2	47	41	3	10	3	39
Consumer NPC (ratio)	0.78	0.98	0.67	0.70	0.97	0.87	0.95	0.56
Consumer NRP (%)	-22	-2	-33	-30	-3	-13	-5	-44
Consumer NAC (ratio)	0.79	0.98	0.68	0.71	0.97	0.91	0.97	0.72
PSE (USD mn)	-0.6	-0.1	-1.8	-2.6	-0.3	-1.3	-0.3	-7.5
PSE (%)	-55.7	-4.5	-100	-157	-15.3	-11.5	-1.4	-46.6
Producer NAC (ratio)	0.6	1.0	0.5	0.4	0.92	0.94	1.0	0.7
Producer Single Commodity Transfers (USD mn)	-0.6	-0.1	-1.8	-2.6	-0.3	-1.3	-0.3	-7.5
SCT (%)	-56	-4	-100	-158	-15	-11	-1	-47

Source: Author's calculations.

Table A5. Cotton lint

COTTON	2000	2001	2002	2003	2004	2005	2006	2007
Producer NPC (ratio)	0.41	0.44	0.42	0.43	0.41	0.45	0.43	0.44
Producer NRP (%)	-59	-56	-58	-57	-59	-55	-57	-56
Consumer Support Estimate (USD mn)	9	36	14	16	26	8	12	21
CSE (%)	121.9	121.7	122.1	122.3	121.8	122.2	122.4	122.1
Consumer NPC (ratio)	0.44	0.45	0.43	0.42	0.44	0.43	0.45	0.41
Consumer NRP (%)	-56	-55	-57	-58	-56	-57	-55	-59
Consumer NAC (ratio)	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
PSE (USD mn)	-58	-73	-85	-123	-115	-90	-83	-88
PSE (%)	-122.1	-122.3	-122.2	-121.9	-122.1	-122.3	-122.0	-122.4
Producer NAC (ratio)	0.447	0.449	0.451	0.452	0.454	0.448	0.447	0.451
Producer Single Commodity Transfers (USD mn)	-58	-73	-85	-123	-115	-90	-83	-88
SCT (%)	-121.9	-122.1	-122.3	-121.9	-122.3	-122.2	-121.9	-122.1

Source: Author's calculations

Table A6. Milk

MILK	2000	2001	2002	2003	2004	2005	2006	2007
Excess feed cost (USD mn)	-0.77	-0.36	0.29	2.67	-0.60	9.25	12.40	-5.47
Producer NPC (ratio)	-0.4	-2.2	-2.7	2.1	0.5	-2.6	0.79	-0.2
Producer NRP (%)	-140	-320	-370	110	-50	-360	-21	-120
Consumer Support Estimate (USD mn)	-49	-49	-45	-52	-52	-69	-85	-105
CSE (%)	-169	-111	-110	-89	-87	-105	-78	-150
Consumer NPC (ratio)	-1.4	-9.2	-9.7	9.1	7.5	-18.6	4.4	-2.0
Consumer NRP (%)	-0.4	-2.2	-2.7	2.1	0.5	-2.6	0.79	-0.2
Consumer NAC (ratio)	-140	-320	-370	110	-50	-360	-21	-120
PSE (USD mn)	50.0	49.5	44.7	49.5	52.8	60.3	73.5	110.9
PSE (%)	159	93	84	59.9	57.0	55.7	48.7	90.9
Producer NAC (ratio)	-1.7	14.3	6.3	2.5	2.3	2.3	1.9	11.0
Producer Single Commodity Transfers (USD mn)	50.0	49.5	44.7	49.5	52.8	60.3	73.5	110.9
SCT (%)	159.5	93.0	84.2	59.9	57.0	55.7	48.7	90.9

Source: Author's calculations.

Table A7. Beef and Veal

BEEF AND VEAL	2000	2001	2002	2003	2004	2005	2006	2007
Excess feed cost (USD mn)	-0.44	-0.20	0.167	1.53	-0.35	5.22	7.09	-3.13
Producer NPC (ratio)	0.65	1.02	1.10	1.43	1.43	1.43	1.43	1.43
Producer NRP (%)	-35	2	10	43.2	42.9	43.1	43.0	43.3
Consumer Support Estimate (USD mn)	21	-1	-5	-19	-25	-25	-27	-35
CSE (%)	53	-2	-9	-30	-30	-30	-30	-30
Consumer NPC (ratio)	0.65	1.02	1.10	1.431	1.43	1.43.1	1.43.2	1.432
Consumer NRP (%)	-35	2	10	43	43	43	43	43
Consumer NAC (ratio)	0.65	1.02	1.10	1.432	1.43	1.431	1.43	1.43
PSE (USD mn)	-7.3	0.6	2.2	11.7	18.5	13.1	11.7	28.6
PSE (%)	-50.1	2.8	8.1	26.6	30.8	21.8	19.0	34.1
Producer NAC (ratio)	0.7	1.0	1.1	1.4	1.41	1.3	1.2	1.5
Producer Single Commodity Transfers (USD mn)	-7.3	0.6	2.2	11.7	18.5	13.1	11.7	28.6
SCT (%)	-50.1	2.8	8.1	26.6	30.8	21.8	19.0	34.1

Source: Author's calculations.

Table A8. Rice milled equivalent

RICE	2000	2001	2002	2003	2004	2005	2006	2007
Producer NPC (ratio)	1.5	2.3	3.8	2.5	1.4	2.3	2.5	1.1
Producer NRP (%)	50	130	280	150	40	130	150	10
Consumer Support Estimate (USD mn)	-5	-13	-21	-18	-5	-13	-20	-1
CSE (%)	-28	-56	-73	-57	-26	-45	-55	-7
Consumer NPC (ratio)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Consumer NRP (%)	-99.1	-98.9	-99	-99.2	-98.7	-99	-98.8	-99.1
Consumer NAC	1.4	2.3	3.7	2.3	1.4	1.8	2.2	1.1
PSE (USD mn)	7.8	9.0	22.1	19.2	6.8	18.9	22.7	1.2
PSE (%)	29.2	57.1	73.4	58.0	27.2	45.5	55.8	8.2
Producer NAC (ratio)	1.4	2.3	3.8	2.4	1.4	1.8	2.3	1.1
Producer Single Commodity Transfers (USD mn)	7.3	8.7	21.4	18.5	6.4	18.1	21.9	1.0
SCT (%)	23	16	40	22	7	17	15	1

Source: Author's calculations.

Table A9. Mutton and Goat

MUTTON & GOAT	2000	2001	2002	2003	2004	2005	2006	2007
Excess feed cost (USD mn)	-0.476	-0.220	0.180	1.66	-0.37	5.73	7.68	-3.39
Producer NPC (ratio)	0.8	0.9	0.8	0.9	0.9	0.9	1.2	1.5
Producer NRP (%)	-20	-10	-20	-10	-10	-10	20	50
Consumer Support Estimate (USD mn)	5.0	3.0	5.1	4.0	3.2	6.5	-13.7	-38.9
CSE (%)	29.7	14.3	19.0	9.3	5.7	9.7	-17.0	-34.7
Consumer NPC (ratio)	0.8	0.9	0.8	0.9	0.9	0.9	1.2	1.5
Consumer NRP (%)	-20	-10	-20	-10	-10	-10	20	50
Consumer NAC (ratio)	0.8	0.9	0.8	0.9	0.9	0.9	1.2	1.5
PSE (USD mn)	-4.5	-2.8	-5.3	-5.6	-2.8	-12.2	6.1	42.3
PSE (%)	-27	-13	-20	-13	-5	-18	8	38
Producer NAC (ratio)	0.8	0.9	0.8	0.9	1.0	0.8	1.1	1.6
Producer Single Commodity Transfers (USD mn)	-4.5	-2.8	-5.3	-5.6	-2.79	-12.24	6.07	42.35
SCT (%)	-26.9	-13.3	-19.7	-13.2	-5.0	-18.2	7.5	37.8

Source: Author's calculations.

Table A10. Poultry

POULTRY	2000	2001	2002	2003	2004	2005	2006	2007
Excess feed cost (USD mn)	-0.06	-0.03	0.02	0.19	-0.04	0.66	0.89	-0.39
Producer NPC (ratio)	2.0	1.9	2.0	1.9	1.8	2.0	2.1	2.3
Producer NRP (%)	100	90	100	90	80	100	110	130
Consumer Support Estimate (USD mn)	-0.6	-0.5	-1.1	-4.3	-7.4	-15.0	-6.4	-10.5
CSE (%)	-49	-47	-50	-48	-44	-49	-53	-57
Consumer NPC (ratio)	2.0	1.9	2.0	1.9	1.8	2.0	2.1	2.3
Consumer NRP (%)	100	90	100	90	80	100	110	130
Consumer NAC (ratio)	2.0	1.9	2.0	1.9	1.8	2.0	2.1	2.3
PSE (USD mn)	0.18	0.15	0.09	-0.08	0.29	-0.36	0.25	1.69
PSE (%)	72	57	41	-32	51	-58	11	74
Producer NAC (ratio)	3.5	2.3	1.7	0.8	2.1	0.6	1.1	3.9
Producer Single Commodity Transfers (USD mn)	0.18	0.15	0.09	-0.08	0.29	-0.36	0.25	1.69
SCT (%)	72	57	41	-32	51	-58	11	74

Source: Author's calculations.

Table A11. Eggs

EGGS	2000	2001	2002	2003	2004	2005	2006	2007
Producer NPC (ratio)	1.01	1.03	2.02	2.03	2.01	1.99	2.04	1.97
Producer NRP (%)	0	0	99.6	100.2	99.9	100.3	99.8	100.1
Consumer Support Estimate (USD mn)	-0.4	-1.1	-1.9	-3.8	-5.5	-8.2	-6.8	-5.4
CSE (%)	-18	-29	-41	-49	-52	-57	-48	-40
Consumer NPC (ratio)	1	1	2	2	2	2	2	2
Consumer NRP (%)	0	0	100	100	100	100	100	100
Consumer NAC (ratio)	1	1	2	2	2	2	2	2
PSE (USD mn)	0.3	0.8	1.4	2.2	3.4	5.2	4.5	3.7
PSE (%)	18	29	41	49	52	57	48	40
Producer NAC (ratio)	1.2	1.4	1.7	1.9	2.1	2.3	1.9	1.7
Producer Single Commodity Transfers (USD mn)	0.3	0.8	1.4	2.2	3.4	5.2	4.5	3.7
SCT (%)	18	29	41	49	52	57	48	40

Source: Author's calculations.

Table A12. Potato

POTATO	2000	2001	2002	2003	2004	2005	2006	2007
Excess feed cost (USD mn)	-1.3	-0.8	0.4	6.1	0.6	7.5	17.9	0.5
Producer NPC (ratio)	0.7	0.8	1.0	1.7	1.1	1.6	1.9	1.1
Producer NRP (%)	-30	-20	0	70	10	60	90	10
Consumer Support Estimate (USD mn)	10.2	4.8	-1.5	-15.0	-1.6	-16.7	-39.9	-2.6
CSE (%)	49.3	19.7	-4.6	-40.5	-5.9	-38.6	-47.2	-5.3
Consumer NPC (ratio)	0.7	0.8	1.0	1.7	1.1	1.6	1.9	1.1
Consumer NRP (%)	-30	-20	0	70	10	60	90	10
Consumer NAC (ratio)	0.7	0.8	1.0	1.7	1.1	1.6	1.9	1.1
PSE (USD mn)	-12.0	-7.9	2.5	30.4	3.6	37.0	86.6	8.7
PSE (%)	-44	-18	4	34	6	32	39	6
Producer NAC (ratio)	0.7	0.8	1.0	1.5	1.1	1.5	1.6	1.1
Producer Single Commodity Transfers (USD mn)	-12.0	-7.9	2.5	30.4	3.6	37.0	86.6	8.7
SCT (%)	-44	-18	4	33.9	5.6	32.3	39.2	5.9

Source: Author's calculations.

Table A13. Onion

ONION	2000	2001	2002	2003	2004	2005	2006	2007
Producer NPC (ratio)	0.83	0.84	0.83	0.83	0.84	0.83	0.83	0.83
Producer NRP (%)	-17.1	-16	-17.2	-17.1	-16	-17.2	-17.4	-17.1
Consumer Support Estimate (USD mn)	1.9	3.9	1.8	3.1	2.5	4.4	7.4	6.7
CSE (%)	20.2	19.7	20.6	19.8	19.6	20.4	19.9	20.1
Consumer NPC (ratio)	0.81	0.84	0.79	0.8	0.82	0.78	0.83	0.77
Consumer NRP (%)	-19.9	-20.1	-19.9	-19.8	-19.8	-19.9	-19.8	-20.0
Consumer NAC (ratio)	0.83	0.77	0.78	0.83	0.81	0.79	0.81	0.83
PSE (USD mn)	-2.4	-4.5	-2.3	-4.4	-3.4	-5.4	-9.2	-12.7
PSE (%)	-20.1	-20.4	-21.0	-20.2	-20.1	-20.3	-20.4	-20.2
Producer NAC (ratio)	0.79	0.81	0.83	0.77	0.82	0.78	0.83	0.81
Producer Single Commodity Transfers (USD mn)	-2.4	-4.5	-2.3	-4.4	-3.4	-5.4	-9.2	-12.7
SCT (%)	-20.2	-19.7	-20.6	-19.8	-19.6	-20.4	-19.9	-20.1

Source: Author's calculations.

Table A14. Tomato

TOMATO	2000	2001	2002	2003	2004	2005	2006	2007
Producer NPC (ratio)	0.83	0.77	0.78	0.83	0.81	0.79	0.81	0.83
Producer NRP (%)	-19.8	-19.9	-20.1	-20.3	-20.4	-20.2	-20.1	-19.9
Consumer Support Estimate (USD mn)	5.9	6.3	6.8	12.6	11.4	18.8	21.2	12.3
CSE (%)	19.9	20.1	19.9	19.8	19.8	19.9	19.8	20.0
Consumer NPC (ratio)	0.79	0.81	0.83	0.77	0.82	0.78	0.83	0.81
Consumer NRP (%)	-20.0	-19.8	-20.0	-19.9	-19.8	-19.8	-19.8	-18.1
Consumer NAC (ratio)	0.83	0.77	0.78	0.83	0.81	0.79	0.81	0.83
PSE (USD mn)	-6.4	-6.9	-7.0	-12.9	-15.2	-23.0	-21.6	-21.5
PSE (%)	19.8	19.9	20.01	20.1	20.4	20.0	19.9	20.1
Producer NAC (ratio)	0.81	0.84	0.79	0.8	0.82	0.78	0.83	0.77
Producer Single Commodity Transfers (USD mn)	-6.4	-6.9	-7.0	-12.9	-15.2	-23.0	-21.6	-21.5
SCT (%)	-19.9	-20.1	-19.9	-19.8	-19.8	-19.9	-19.8	-20.0

Source: Author's calculations.

Table A15. Lemon

LEMON	2000	2001	2002	2003	2004	2005	2006	2007
Producer NPC (ratio)	0.83	0.77	0.78	0.83	0.81	0.79	0.81	0.83
Producer NRP (%)	-20.0	-19.8	-20.0	-19.9	-19.8	-19.8	-19.8	-18.1
Consumer Support Estimate (USD mn)	0.3	0.3	0.1	0.1	0.2	0.2	0.2	0.3
CSE (%)	19.8	19.9	20.01	20.1	20.4	20.0	19.9	20.1
Consumer NPC (ratio)	0.81	0.84	0.79	0.8	0.82	0.78	0.83	0.77
Consumer NRP (%)	-20.0	-19.8	-20.0	-19.9	-19.8	-19.8	-19.8	-18.1
Consumer NAC (ratio)	0.81	0.84	0.79	0.8	0.82	0.78	0.83	0.77
PSE (USD mn)	-0.3	-0.3	-0.2	-0.1	-0.2	-0.2	-0.2	-0.3
PSE (%)	-19.8	-19.9	-20.1	-20.3	-20.4	-20.2	-20.1	-19.9
Producer NAC (ratio)	0.79	0.81	0.83	0.77	0.82	0.78	0.83	0.81
Producer Single Commodity Transfers (USD mn)	-0.3	-0.3	-0.2	-0.1	-0.2	-0.2	-0.2	-0.3
SCT (%)	-19.8	-19.9	-20.0	-20.0	-20.0	-20.0	-19.9	-20.0

Source: Author's calculations.

Table A16. Grape

GRAPE	2000	2001	2002	2003	2004	2005	2006	2007
Producer NPC (ratio)	0.81	0.84	0.79	0.8	0.82	0.78	0.83	0.77
Producer NRP (%)	-19.8	-20.1	-20.4	-20.3	-20.2	-19.7	-20.1	-19.9
Consumer Support Estimate (USD mn)	6.1	3.4	3.8	1.2	8.6	8.6	10.9	7.0
CSE (%)	20.0	19.8	20.0	19.9	19.9	20.01	20.0	20.03
Consumer NPC (ratio)	0.83	0.77	0.78	0.83	0.81	0.79	0.81	0.83
Consumer NRP (%)	-19.8	-19.9	-20.1	-20.3	-20.4	-20.2	-20.1	-19.9
Consumer NAC (ratio)	0.81	0.84	0.79	0.8	0.82	0.78	0.83	0.77
PSE (USD mn)	-8.3	-6.2	-6.2	-3.1	-12.4	-12.4	-15.7	-9.4
PSE (%)	-20.0	-19.8	-20.0	-19.9	-19.8	-19.8	-19.8	-18.1
Producer NAC (ratio)	0.79	0.81	0.83	0.77	0.82	0.78	0.83	0.81
Producer Single Commodity Transfers (USD mn)	-8.3	-6.2	-6.2	-3.1	-12.4	-12.4	-15.7	-9.4
SCT (%)	-20.0	-19.8	-20.0	-19.9	-19.8	-19.8	-19.8	-18.1

Source: Author's calculations.

Table A17. Apple

APPLE	2000	2001	2002	2003	2004	2005	2006	2007
Excess feed cost (USD mn)	-0.1	-0.3	-0.02	-0.04	-2.1	-1.7	-6.7	-3.3
Producer NPC (ratio)	0.81	0.84	0.79	0.77	0.82	0.84	0.78	0.83
Producer NRP (%)	-19.7	-20.1	-20.3	-19.8	-19.6	-20.4	-20.1	-20.2
Consumer Support Estimate (USD mn)	0.7	0.2	0.3	0.4	1.6	1.5	2.0	1.3
CSE (%)	20.5	20.1	20.0	19.9	20.0	19.9	20.0	19.9
Consumer NPC (ratio)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Consumer NRP (%)	-19.8	-20.1	-20.3	-20.4	-20.1	-19.9	-20.1	-19.7
Consumer NAC (ratio)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
PSE (USD mn)	-5.4	-3.5	-4.9	-4.7	-7.9	-9.6	-9.1	-4.9
PSE (%)	-20	-18	-20	-20	-16	-17	-11	-11
Producer NAC (ratio)	0.79	0.81	0.78	0.82	0.92	0.91	0.9	0.93
Producer Single Commodity Transfers (USD mn)	-5.4	-3.5	-4.9	-4.7	-7.9	-9.6	-9.1	-4.9
SCT (%)	-20.2	-18.4	-19.9	-19.8	-15.6	-16.8	-11.4	-10.6

Source: Author's calculations.

Table A18. Other commodities*

OTHER COMMODITIES	2000	2001	2002	2003	2004	2005	2006	2007
Producer NPC (ratio)	1.01	1.03	1.04	1.02	0.99	1.02	0.97	1.01
Producer NRP (%)	0	0	0	0	0	0	0	0
PSE (USD mn)	-0.4	0.8	0.8	1.0	0.9	6.8	16.4	20.7
PSE (%)	-2.1	2.2	2.5	2.2	1.5	8.4	12.7	12.5
Producer NAC (ratio)	0.97	1.01	1.03	1.02	1.04	1.12	1.14	1.13
Producer Single Commodity Transfers (USD mn)	-0.4	0.8	0.8	1.0	0.9	6.8	16.4	20.7
SCT (%)	-2.1	2.2	2.5	2.2	1.5	8.4	12.7	12.5

Source: Author's calculations.

Notes: *Other commodities include: Apricots, Cabbages and other brassicas, Carrots and turnips, Cucumbers and gherkins, Fruit Fresh Nes, Garlic, Honey-natural, Nuts-nes, Peaches and nectarines, Peas-dry, Plums and sloes, Pig meat, Safflower seed, Sesame seed, Sunflower seed, Tobacco-unmanufactured, Vegetables fresh nes, Watermelons.

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