

Restructuring Sugar Beet Market in Turkey: Increasing Transfer Efficiency via Decreasing Distortion

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Jel classification: Q11; Q18

1. Introduction

Fulfilling approximately about 10 % of daily per capita calories need in developed countries and about 6 % in developing ones, sugar arises as the key food-stuff for sustainable nutrition (FAO, 2005). In the world's total sugar production, sugar beet has a share of about 25 % and the rest is shared between artificial¹ and cane sugar. While production of sugar cane seems to have a cost advantage compared to sugar beet, isoglucose is relatively cheaper compared to cane and beet sugar and may be kept in the liquid form². The average cost of beet sugar is nearly 475 \$/ton when cane sugar is 350 \$/ton and isoglucose is 325 \$/ton (OECD, 1997). Because of the lower cost, isoglucose production seems to have a competitive advantage compared to the others; however, the same competitive advantage invites government intervention and protection measures in various countries in order to remove or reduce this cost advantage.

In Turkey sugar beet production is controlled by the state institution T.S.F.A.S (Turkish Sugar Factories). Various problems regarding sugar beet production have been overcome so far, but the competition between producers of artificial sugar arises as another problem recently in the marketing process. Sugar beet production is carried out by nearly 450.000 contracted farmers in 65 provinces (out of 81) in Turkey. The majority of these contracted producers are engaged in small scale production as about 80 % of sown land by beet producers is less than 2.47 acres. Sown area per producer is about 0.7 acres in 2002, which is quite low compared to the European Union (EU) countries. For example, sown area per producer is 9.1 acres in Germany,

Abstract

Recently, Turkey launched a comprehensive policy reform program, of which the restructuring in the agricultural policies and markets constituted a major component, under the guidance and proviso of the IMF and World Bank. If one considers the policy instruments, the time of their application and the developments in the performance of the domestic agricultural markets, the transfer efficiency/inefficiency of the support system arises as the major problem. Hence, in this study it is aimed to measure the short run transfer efficiency and welfare effects of two alternative policy instruments, support purchasing and deficiency payment systems.

Résumé

Tout récemment, la Turquie a lancé un programme de réformes politiques sous le guide du FMI et de la Banque Mondiale, parmi lesquelles la restructuration des politiques et des marchés agricoles représente l'élément majeur. En considérant les instruments politiques, leur période d'application et les développements des marchés agricoles nationaux, le problème principal qui se pose est le degré d'efficacité dans le transfert du système de soutien. Cette étude offre une évaluation de l'efficacité du transfert à court terme et les effets du welfare de deux instruments politiques alternatives: l'achat du soutien et les systèmes de paiements déficitaires. ssance rapide ont moins de motivations en termes d'investissements en R&D.

20.72 acres in UK, 13.63 acres in France, 5.48 acres in Spain and 3.5 acres in Italy in 2003 (Gunel et al., 2005: pp. 442-445). The main statistical indicators regarding the sugar/beet market in Turkey are given in Table 1. Turkey is a net exporter of sugar and about 98% of the total beet production is marketed and T.S.F.A.S. buys the majority of the production. The average productivity in Turkey is about 42 tons per hectare, which is very close to the world average; however, this is well behind the EU average of 62 tons per hectare in 2003³ (MARA, 2005: pp. 143).

Sugar beet/sugar can be specified as a special and strategic product for Turkey considering its importance for the food industry, its place in Turkey's agricultural sector and the number of people who earn their lives from a beet/sugar related production activity. However, for various reasons there is uncertainty regarding the agricultural policy framework that is going to be in place for the agricultural sector as a whole and for the beet/sugar itself in the near future. Turkey has to take into consideration various developments regarding Common A-

Tab. 1. Structural indicators of sugar beet market in Turkey

| Structural Indicators | Unit | 2004 |
|-----------------------|----------|---------|
| Harvested area | Ha | 315,000 |
| Sugar beet production | 000 t | 13,261 |
| Yield | t/Ha | 42.1 |
| Production value | 000 Euro | 798,304 |
| Marketed value | 000 Euro | 778,347 |
| Sugar production | 000 t | 1,894 |
| Sugar demand | 000 t | 1,720 |
| Net sugar trade | 000 t | 174 |
| Production cost | Euro/t | 39.6 |
| Producer price | Euro/t | 60.2 |

Source: OECD (2005), SIS (2004b)

¹ Artificial sugar consists of isoglucose (corn sugar) and saccharin.

² However, it should be kept in mind that cane is more vulnerable to bad weather conditions.

³ See Appendix Table A1 for structural parameters in the sugar/beet market.

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gricultural Policy (CAP) of the EU, the new rounds of the World Trade Organization (WTO) negotiations and the new stand by agreements with the International Monetary Fund (IMF), in addition its domestic constraints, particularly trade account deficit and public budget deficit, while structuring its sugar beet market policy instruments. All these developments call for an economic impact assessment analysis to evaluate the possible outcomes of alternative policy options in advance.

In the second part of the study, brief information regarding the current policies and possible near future policy options in the sugar beet/sugar markets of the EU and Turkey and recent developments in the WTO was provided. Following that, the empirical methodology employed in the study was explained. In the fourth section, alternative policy scenarios were introduced and empirical analyses were carried out in section 5. The paper concludes in section 6 with the discussion of policy outcomes.

2. Policy developments in the world and Turkey's sugar beet/sugar markets

2.1. Policy framework for the sugar beet/sugar market in Turkey

In Turkey economic activities regarding the sugar market such as production, price determination, marketing etc. are under the control of state monopoly. There are 30 sugar beet processing factories of which 27 are public, 1 is private and 2 are owned by the producers' cooperatives. The sugar beet/sugar policy regime in Turkey may be better identified as being "under the influence of hegemonic political preferences". A wide variety of policy measures have been implemented to meet the objectives in the sugar beet/sugar market. A summary of these policies is given in Table 2.

Provision of support via intervention/guaranteed price for long years, has resulted in continuing excess supply of sugar beet and in order to reduce this excess, production quota (contract farming) has been put in place since 1999. However, contract farming considered restricting production⁴ rather than sawn acreage. A significant decrease in price support was not considered as an alternative policy since the number of farm households involved in sugar beet production is quite high. The guaranteed price regime was supported by restricting imports via import tariffs and the resulting excess supply is exported by provision of export subsidies. In April 2001, a new Sugar Law was accepted⁵, as an imposition of the stand-by agreement with the IMF, and this law aimed to achieve significant changes in sugar beet/sugar policy regime.

⁴ Farmers who have exceeded his/her production quota should pay a fine (over quota payment).

⁵ This law replaced the old Sugar Law issued in 1956.

⁶ The only imports are in cane sugar and from ACP (African, Caribbean, Pacific countries). There will be a reduction in import tariffs in the EU according to WTO negotiations. However, the EU should continue importing cane sugar at a high price in order to prevent the revenue loss created for ACP countries ("Everything but Arms" contract), Talks (2005).

The new Law aimed at privatizing in public sugar-related institutions. The intervention price and production quota levels were determined together by considering the actual demand amount realized in the previous year, in order to reduce the excess supply. This resulted in a fall in nominal

Tab. 2. *Current policy tools of sugar beet market in Turkey*

| Policy Tools | Unit | 2004 |
|---|----------|--------|
| <i>Input subsidy</i> | 000 Euro | 26,502 |
| <i>Export subsidy</i> | 000 Euro | 35,060 |
| <i>Production quota</i> | 000 t | 14,200 |
| <i>Over quota exemption rate</i> | % | 15.0 |
| <i>Over quota payments</i> | % | 50.0 |
| <i>Import tariff</i> | % | 138.0 |
| <i>Nominal protection rate</i> | % | 3.7 |
| <i>Reference price</i> | Euro/t | 16.2 |
| <i>Target price</i> | Euro/t | 60.2 |
| <i>Support price</i> | Euro/t | 60.2 |
| <i>Support purchases</i> | 000t | 10,200 |
| <i>Share of price support in total support amount</i> | % | 0.9 |

Source: Reference price: MARA (2005), OECD (2005); support price: SIS (2004c) and TSFAS; other support data: TSFAS.

intervention price. Except in 2001, input subsidies provided for sugar beet producers have continued after 1997. These input subsidies were given for fertilizers, pesticides, seed usage and irrigation and sowing cost.

2.2. Policy framework to the sugar beet/sugar market in the EU

With its 13 % and 12 % share in the world's total production and consumption respectively, the EU stands out as an important actor in the world sugar market. Besides, the EU's share in total world exports is about 15 % and it is about 5 % in total imports (Fischler, 2004). Currently, the policy framework regarding sugar/beet market in the EU is quite cumbersome, as it is in Turkey. Both production of beet and imports of sugar are restricted with production quotas, and with tariffs and tariff-rate-quotas respectively. These policies prevent the producer price of beet from falling under a certain level. In the EU, imports are restricted with cane sugar and from only ACP countries⁶. The created excess supply is exported by providing export subsidies to producers. In the EU, liberalization will be put in place in the sugar/beet market starting from 2006. Full liberalization is foreseen in the longer run however, in the short to medium term the liberalization will be partial. This partial liberalization involves the reduction of import tariffs and production quotas (beginning in 2006-07) and with these it is aimed to close the price gap between the EU and world markets. The revenue loss of beet producers, due to the fall in prices, will be compensated by direct deficiency payments (about 60 % of the revenue loss) (Schroeder, 2005). Most probably, even a partial liberalization in the EU sugar market such as a gradual reduction in trade barriers

ers foreseen to start in June 2006 would affect the world market prices. Since about 80 % of sugar consumption in the EU is based on sweeteners, the main effect of even gradual import liberalization is expected to be on world markets rather than domestic market.

Until recently, three policy frameworks regarding the EU sugar beet/sugar market were foreseen as possible. The first one can be identified as the "status quo" in which sugar price is anticipated to stay at high levels in spite of the adjustment in production quota according to WTO agreements. The second scenario aims to narrow the gap between domestic and world sugar price by reducing the production quotas and import tariffs (starting in 2006). In other words sugar market in the EU is opened for competition in the world markets. This has a more "market" oriented base; however, it should be noted that the income loss generated by the fall in prices is planned to be compensated and therefore might create a fiscal problem. The last scenario focuses on the elimination of all intervention prices and production restrictions in 2009. With the declaration in November 2005, now it is apparent that the EU will follow the liberalization program very similar to the one discussed in the second scenario above.

2.3. Developments in the WTO and their importance for Turkey's and the EU's sugar beet/sugar market

The negotiations of liberalization in agricultural trade have mainly started or geared up with the Doha Round in November 2001. Compared to previous Rounds, the Doha Declaration includes stricter rules regarding the reduction of agricultural protection and support measures. Particularly, the "tariff bound"⁷ approach accepted in the Doha Declaration to liberalize borders to ease the market access, is expected to have significant impact on international agricultural trade. The main policy goals agreed by the WTO members and stated in the Declaration are: maintaining further discounts in import barriers to increase market access, maintaining reduction in all kinds of export subsidies and maintaining a decline in domestic support that deteriorates agricultural trade. The anticipation of the developing countries which have agreed with the Declaration and whose economic structure is based on primary and processed agricultural production was that the countries having high quality products can cope with the price competition and can benefit from liberalization⁸.

The next step in agricultural negotiations was in Cancun in 2003. In the draft proposal the mainly discussed topics were again the removal of trade barriers to increase market access, reduction of export subsidies and reduction of do-

mestic support, to liberalize agricultural trade. The proposed liberalization in tariff rates for developed countries involved an average reduction of 60 %, 50 % and 40 % if the initial tariff rate is above 90 %, between 15-90 % and below 15 % respectively. At product level, the minimum level of tariff reduction should be 45 %, 35 % and 25 % for these three initial tariff ranges respectively. The reduction in tariff rates should be completed in five years. The same proposal suggested an average reduction of 40 %, 35 %, 30 % and 20 % if the initial tariff rate is above 120 %, between 60-120 %, between 20-60 % and below 20 % respectively for the developing countries. At product level the minimum level of tariff reduction was stated to be 35 %, 25 %, 20 % and 15 % for these four initial tariff ranges respectively. For the special products the average and minimum levels were proposed to be 10 % and 5 % respectively. The reduction in tariff rates should be completed in ten years⁹.

Previously 25 WTO member countries were allowed to provide export subsidies for their selected products, with the pledge of reducing subsidy levels in the future. The second step that is going to be applied in the export subsidy reduction process involves a 50 % decrease for all countries. The final step involves termination of export subsidies at the end of the three years after the implementation of 50 % reduction for the developed countries and at the end of six years for the developing countries.

Maybe the most challenging discussions regard domestic support. Currently all the policies that have direct distortional impacts on production and trade are included in the amber box and in the first step a significant reduction¹⁰ in these is foreseen in the near future. While some countries propose the termination of these policies in the second step, some others suggest a gradual reduction such as three to five years for developed countries and about 9 years for developing countries. There is still not a consensus about the content of the blue box measures. While some countries propose the inclusion of policies that distort trade and that are currently included in the blue box¹¹, in the amber box, some others believe that the transfer of policies from blue to amber box may hinder the implementation of agricultural reform process in some countries. According to "tariff bound" proposal, a reduction in support both in amber and blue box is foreseen. Similar arguments are also put forward regarding the policies that are currently included in the green box. The support regarding rural development and environmental protection are not always independent of production and trade as sometimes this yields a reduction in production cost, reduce risk and promote production.

In the EU the policy changes in the sugar beet/sugar market foreseen for the near future are in accordance with the

⁷ Formulated both on Swiss formula and Uruguay Round approaches.

⁸ Since all developing countries are not of the same characteristics, the Doha Declaration allowed some of the developing countries to act accordingly with their policy requirements to achieve food security and rural development.

⁹ Each country is allowed to declare some products as "special" and policy changes regarding these will be determined with mutual agreement.

¹⁰ In the first year, a 20 % reduction in each country allowed upper support bound.

¹¹ These policies include direct payments for acreage and animal number to constrain crop and livestock production.

developments in the WTO. As stated before starting in June 2006 the EU has decided to reduce the tariffs on sugar imports by about 50%. This rate is even above the minimum reduction rate agreed in Doha Round (45 %). Besides, the EU has decided to reduce the domestic price at about 37%. Given these changes, some of the producers and countries are expected to suffer from these policy decisions. The Union is considering both direct payments (and deficiency payments) and/or alternative cropping support to compensate for their loss. This sort of payments might be included under the blue box or green box as support for rural development. Even, shifting production of sugar beet from Mediterranean region to central, eastern and northern regions of the EU is being considered. Based on these policy changes, in the near future provision of export subsidy will not be a necessity since a decrease in excess supply is expected and in this way, the contradiction with the Doha Declaration will disappear. Since about 80 % of the sugar use in food industry in the EU is artificial sugar, the policy changes in sugar beet market are not expected to harm the food industry.

For Turkey the Doha Declaration seems to be more challenging particularly for sugar beet producers. The proposal regarding the tariff reduction in developing countries may threaten beet producers in Turkey. A 40 % decrease in current tariffs would reduce it to about 98 % and a huge fall in

domestic beet production is anticipated. Besides, the difference between the production cost of beet (about 30 Euro/ton) in Turkey and world price of sugar (about 16 Euro/ton) is another disincentive for beet producer unless they are provided input subsidy, which is in amber box of WTO. With the reduced beet price in domestic market, it is impossible for beet producers to compete with the cane producers whose production cost is quite low compared to beet. In addition, compensating beet producers via direct income support or alternative cropping or shifting them to non-agricultural sectors seem to be unrealistic considering the macroeconomic constraints of Turkish economy.

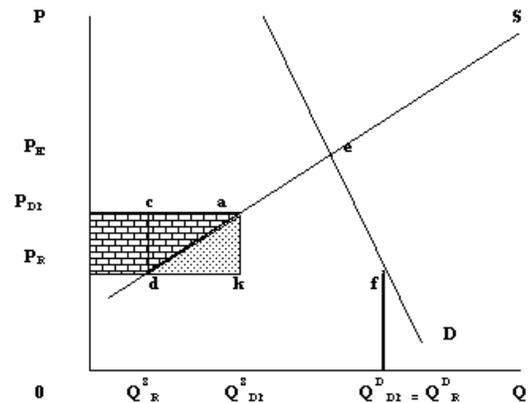
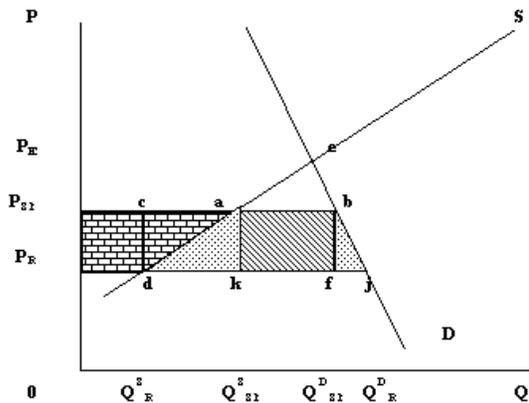
3. Measuring the welfare and transfer efficiency effects of policies

3.1. Methodology: Welfare analysis

In this study, the impact of deficiency payment (DP) and support purchasing (SP) systems on the welfare of various economic agents is analyzed in the partial equilibrium framework¹². In the world markets of analyzed products, Turkey is assumed to be a small country in the international trade and therefore world prices are given exogenously. Based on the divergence between equilibrium price in the domestic market and world price, it is determined whether the country is a net exporter or importer of the product. In

Figure 1. Welfare analysis of support purchasing system

Figure 2. Welfare analysis of deficiency payment system



| | | |
|---|---|--|
| $-b j P_{S21} P_R$ | <i>Change in consumer surplus</i> | - |
| $ad P_{S21} P_R$ | <i>Change in producer surplus</i> | $ad P_{D21} P_R$ |
| $b f j$ | <i>Efficiency loss in consumption</i> | - |
| $ad k$ | <i>Efficiency loss in production</i> | $-ad k$ |
| $ab k f - (P_{S21} a Q_{S21}^S) - (\% 10 * (P_{S21} a Q_{S21}^S))$ | <i>Net effect on the budget</i> | $-P_{D21} a k P_R$ |
| $ab k f$ | <i>import tariff revenue</i> | - |
| $-P_{S21} a Q_{S21}^S$ | <i>support payments / deficiency payments</i> | $-P_{D21} a k P_R$ |
| $-\% 10 * (P_{S21} a Q_{S21}^S)$ | <i>cost of stocks</i> | - |
| $ab k f - (P_{S21} a Q_{S21}^S) - (\% 10 * (P_{S21} a Q_{S21}^S)) - b j P_{S21} P_R + ad P_{S21} P_R$ | <i>Net total effect</i> | $-P_{D21} a k P_R + ad P_{D21} P_R - ad k$ |

¹² A detailed analysis of agricultural policies can be found in Gardner (1988) Houck (1986) and McCalla and Josling (1985).

order to become a net importer, the world price should be lower than the equilibrium price; Figures 1 and 2 represent this situation.

In Figures 1 and 2 P_{SP} and P_{DP} represent support purchasing and target price respectively; in order to compare the effects of both support systems, these intervention prices (announced by the government) are assumed to be equal to each other ($P_S = P_{DP}$). P_R is the actual world market price. Under SP system, public institutions purchase the product at the announced price. However, based on the change in production (due to the price change), government should also put or increase import tariffs in order to achieve the policy goal. Before the government intervenes via a support price, the demand and supply in the domestic market is shown by Q^s_R and Q^d_R respectively and amount of imports are shown by the horizontal distance between Q^s_R and Q^d_R (Figure 1). The support price results in an increase in supply to Q^s_{SP} and in a fall in demand to Q^d_{SP} . As a result imports fall to $Q^d_{SP} - Q^s_{SP}$. While SP yields a rise in producer welfare shown by the area $adP_{SP}P_R$, it causes a decrease in consumer surplus shown by the area $bjP_{SP}P_R$.

In this analysis, the factors that effect government budget are support purchase expenditures, cost of stocking and tariff revenues. The maximum level of tariff revenue is shown by $abkf$, which is calculated by multiplying the customs tax (price gap between world and domestic price) with import level. Assuming that public institutions purchase the total amount of production, its cost is shown by the area $P_{SP}aQ^s_{SP}0$ and in general the cost of stocking is assumed to be equal to 10 % of purchasing expenditure¹³. In this analysis, the area $adP_{SP}P_R$ is transferred from consumers to producers and areas adk and bjf arise as efficiency (dead-weight/social) loss to the economy¹⁴.

The effects of DP system are presented in Figure 2. The target price is announced to be P_{DP} and with this price supply amount increases to Q^s_{DP} ; however, demand stays constant ($Q^d_{DP} = Q^d_R$) since consumption price stays constant at P_R . Given these changes, imports fall from $Q^s_R - Q^d_R$ to $Q^s_{DP} - Q^d_{DP}$. While DP has no effect on consumer surplus (due to the constant consumer price and demand), it yields an increase in producer surplus represented with the area $ad - P_{DP}P_R$.

The cost of DP system is paid only by taxpayers since consumer price stays constant and therefore the sole burden is on government budget. In other words the increase in producer surplus is actually transferred from government budget and it is equal to the area $adP_{DP}P_R$ in Figure 2¹⁵. The maximum amount of import tariff revenue is equal to

the area $adb'f$ although it is not necessary as it is in SP system. Since the government has no obligation to purchase the production there is no stocking cost under DP either. A social/efficiency loss does not arise for consumers due the constant consumer price but on the producers side the efficiency loss is equal to the area adk ¹⁶.

In conclusion, while DP system has no effect on consumers' welfare, both DP and SP systems yield an equal rise in producers' welfare, and SP results in a welfare loss for consumers. Under SP system the rise in welfare of producers is transferred from consumers, while it is transferred from government budget under DP system. In order to account for the total effect on government budget, the cost of support purchases and stocking cost under SP should be compared with the government transfer amount under DP system. In addition, if government imposes import tariffs under DP, the tariff revenue is expected to be higher compared to tariff revenues under SP system¹⁷. The efficiency loss accrues only for producers under DP and for both consumers and producers under SP system.

3.2. Methodology: Transfer efficiency

Transfer efficiency analysis measures the economic cost and income distribution effects of agricultural policy instruments¹⁸. While the latter analyzes the distribution of gross and net income among production factors, the former evaluates the distribution of policy cost among financial economic agents. The effects on income distribution do not differ among SP and DP systems; however, the cost of these policy instruments do differ. Therefore, the difference in the transfer efficiency of these instruments is based on how the policy cost is financed.

Calculating the effect on income distribution under SP and DP systems. In order to evaluate the distributional effects, Helmerger's (1991) three stage procedure is used. At the first stage, the effect on total farm revenue of the intervention price is calculated. Secondly total revenue is reflected on the gross returns of farm-owned factors and finally the net returns to farm-owned factors are calculated. Accordingly, factors of production in the agricultural sector are assumed to be either owned by the farmer or rented by the farm and main farm-owned factors are land and unpaid family labor.

Under both support systems, the revenue of the farm household is expected to rise with the increase in production (due to a higher intervention price) and with the rising employment of farm-owned factors. The possible increase in production is dependent on the increasing rate in inter-

¹³ Cakmak et al. (1998), Demirci (1998).

¹⁴ Because of the rise in domestic prices some consumers are out of market since they cannot demand the good anymore (the loss area shown by bjf). The ones who demand now should pay a higher price as well in order to continue consuming the good. On the producers' side there is also an efficiency loss of adk which is caused by the shift of production factors from production of other goods.

¹⁵ In the analysis, it is assumed that there is no production quota and no limit on per-farmer deficiency payment.

¹⁶ As explained before this loss is caused by the shift of production factors from production of other goods.

¹⁷ It should be kept in mind that public institutions are assumed to purchase all production under SP system and there is no quota on production. In addition, demand and supply elasticity play a crucial role in determining the cost and welfare effects of the policy instruments.

¹⁸ See Dewbre et al. (2001), Helmerger (1991), Helmerger and Chavas (1996), OECD (2004; 2002; 2001; 1996) for an elaborate transfer efficiency analysis of agricultural policies.

vention price and price elasticity of supply. In the short-run it is not an exaggeration to expect only a slight change in supply after the price rise. It is more important to discuss whether this excess supply would have an effect on world prices. Under the “small country” assumption or assuming that the extra production is consumed in the domestic market, the excess supply would have no effect on world price and therefore there should be no feedback effects on domestic markets.

The change in total farm revenue (ΔTR), as a result of a rise in intervention price, either under SP or DP system is calculated as in equation 1 in Chart 1. The change in supply is found by multiplying the base year quantity (Q_s) with supply-price elasticity ($1+\epsilon_s$), and in return the change in total revenue is found by multiplying the supply increase with the price change (ΔP).

The change in gross (ΔGRF) and net returns (ΔNRF) to factors of production is calculated as in equation 2 and 3, respectively. In equation 2, s represents the share of each factor of production (i) in total production cost and n represents the share of farm-owned factors in total factor supply. By multiplying the change in total revenue with each factor's share in production cost and then with the share of farm-owned factors, the change in gross returns is found. It is assumed here that the share of factors does not change and this may be valid only in the short-run. In the medium to long-run, farmers may shift their land and labor to the production of alternative crops or even may shift to non-agricultural production. Therefore, the opportunity cost that arises in the long run should be subtracted from the change in total revenue which is sourced by agricultural support policies.

Gross returns to farm-owned factors are converted into the net equivalent by dividing (ΔGRF) by the supply elasticity of factors of production ($1+e_i$). The net total returns to farm-owned factors are calculated by summing up the net returns to each farm-owned factor (equation 4). It can be concluded that as the share of farm-owned factors decreases and as their supply elasticity increases, the reflection on net farm revenue of total revenue increase will be smaller. In general, the supply elasticity of land is assumed to be lower compared to the supply elasticity of other factors; however, their supply can be considered constant only in the very short run. In addition, it is not expected for any factor to have perfect supply elasticity. Naturally, as we move from short to medium and to long-run, net returns will decline and the majority of this return will be transferred to land owners. In other words, as the adjustment period after policy intervention gets longer, the efficiency of the transfer will go down as well. As it is observed from the equa-

tion specification, the change in total revenue is also transferred to input sectors (via purchased inputs) and this can be the main source of revenue leakages.

Calculating the policy cost under SP system. The cost of SP system is financed both by taxpayers and consumers. The change in taxpayer costs are calculated as specified in equation 5 (Chart 1). The multiplication of the last two terms in the equation gives the change in total revenue due to the rise in intervention price. The variable ds is less/more than 1 if the country is net exporter/importer. The taxpayer cost critically depends on whether the country is a net exporter or importer. If the country is a net exporter, government should give export subsidy to exporters to compensate for the difference between world and support price. In the opposite case, government may charge customs tax for the imports. Therefore, change in taxpayer cost becomes positive/negative when the country is a net exporter/importer.¹⁹

Change in consumer costs is given in equation 6. Basically, this equation accounts for the effect of higher intervention price on consumers by calculating the change in consumer surplus (equation 6 and 7)²⁰. The consumer surplus measure does not only account for the extra expenditure due to the rise in intervention price, but also account for the effect of fall in demand due to the same reason. Then, in equation 8 the change in consumer surplus is converted to its cost equivalent by multiplying and dividing the last expression in equation 7 by $-Q_s$. The cost version is more convenient since it can be added to the taxpayer costs and also in the cost version Q_d is eliminated. Finally, the total cost of SP system is found by adding up the taxpayer (equation 5) and consumer costs (equation 8) in equation 9 (Chart 1).

Calculating the policy cost under DP system. The cost of DP system involves only the taxpayer costs since the consumers continue consuming from the lower world price. Taxpayer cost has two components. The first component is the amount that should be paid for the existing production level, which is shown in the first parenthesis in equation 10. The second component in the taxpayer costs is sourced by the rise in production due to the created incentive via a higher target price, which is calculated in the second parenthesis (equation 10).

Calculating transfer efficiency under SP and DP systems. Transfer efficiency of policy instruments is calculated as the ratio of change in net farm revenue to the change in cost of policy instrument. These are represented in equations 13 and 14 for the SP and DP system respectively. In other words, it can be defined as the change in policy cost that is caused by the 1 unit change in net farm revenue. Therefore, the first condition to be achieved for efficiency is that the increase in net farm revenue should be more than the increase in policy cost.

4. Policy scenarios

In this study, three policy scenarios were foreseen to be possible alternatives in the near future regarding the sug-

¹⁹ In the first and second parentheses in equation 5 the variable m_{ps} shows the share of market price support in total support.

²⁰ Equation 7 is obtained by exploiting the demand elasticity formula:

$$\epsilon_d = \frac{\Delta Q_d}{Q_d} * \frac{P_{SU}}{P_{SU}} \text{ so that } \Delta Q_d = \epsilon_d * \frac{\Delta P_{SU}}{P_{SU}} * Q_d \text{ obtained}$$

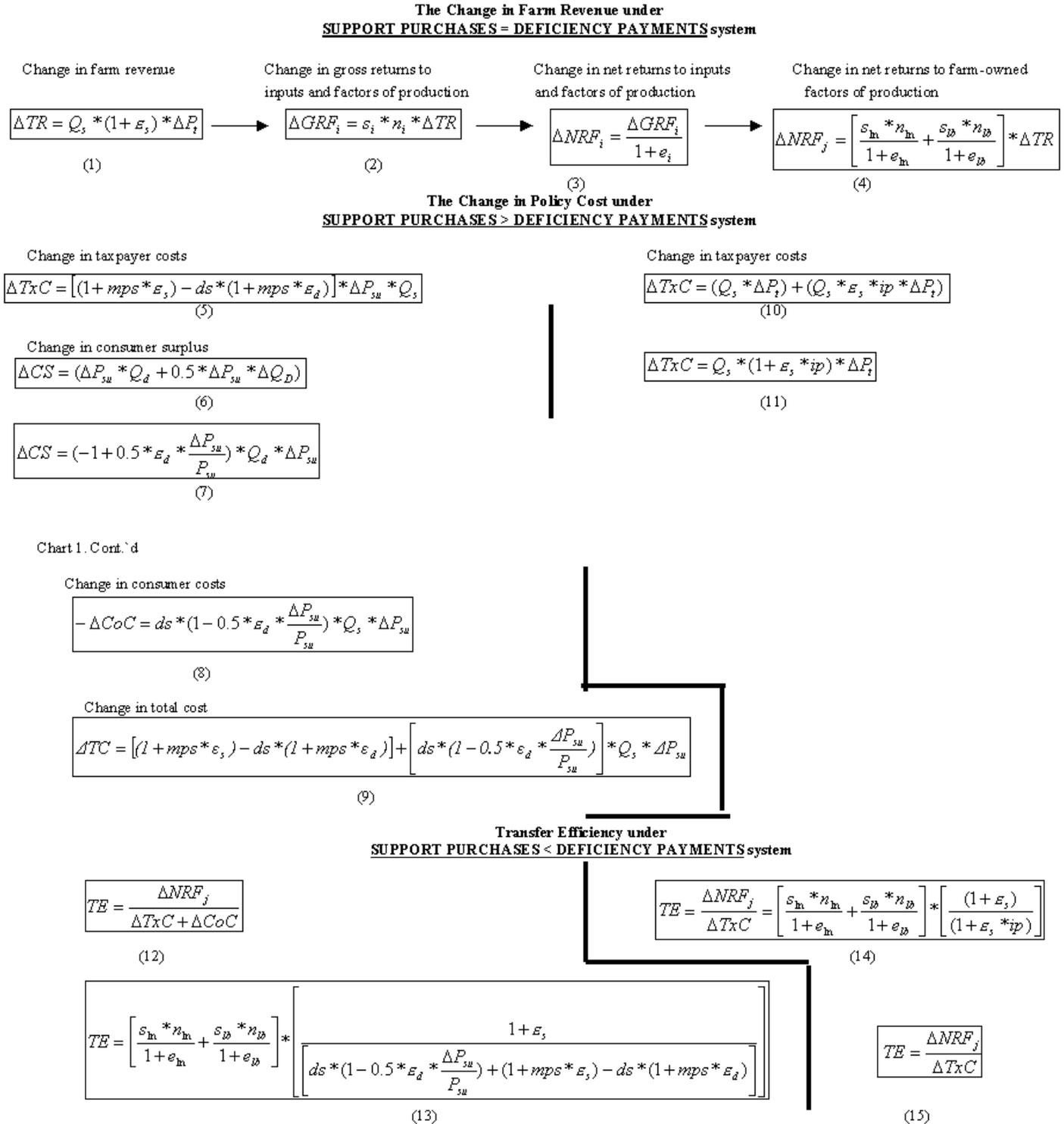
ar/bee market in Turkey. These scenarios were formulated considering the domestic and foreign dynamics, which were mentioned somewhere else before in the text, that are possibly to affect Turkey's policy framework regarding this market. A summary of the policy instruments and shocks

that are involved in the scenarios are given in Table 3.

4.1. Scenario 1: Turkey adopts CAP-partial liberalization

Turkey's adoption of CAP can be interpreted as the adop-

Chart 1: Measuring transfer efficiency of support purchasing and deficiency payments system



Variables:

| | |
|---|---|
| ΔCoC : change in consumer costs | mps : share of market price support in total support |
| ΔGRF : change in gross returns to factors of production | P_m : support price |
| ΔNRF : change in net returns to factors of production | P_t : target price |
| ΔTC : change in total cost | P_w : reference price |
| ΔTR : change in total revenue | Q : production |
| ΔTxC : change in taxpayer costs | TE : transfer efficiency |
| e : supply elasticity of factors of production | i : agricultural land, labor, all purchased inputs |
| f : farm-owned factors of production | h, s : farm-owned land and unpaid labor |
| n : share of farm-owned factors of production | s : share of factors of production in total production cost |
| ϵ_s : price elasticity of supply | ϵ_d : price elasticity of demand |
| d_s : ratio of domestic demand to domestic supply | ip : initial payment rate $((P_t - P_w) / P_t)$ |

tion of beet/sugar producer price in the EU, accordingly with the foreseen partial liberalization schedule. As it is observed in Table 3, price adoption yields a fall in per ton producer prices from 60200 Euro in 2004 to 27400 Euro in 2007 (55 % reduction in support price in Turkey compared to 2004). With the price fall, nominal protection rate in 2007 falls down to 1.7 as well and import tariffs are reduced to EU levels. As a decrease in production and an increase in imports is expected due to the fall in producer prices and nominal protection rate, production quotas in Turkey become redundant. However, Turkey's beet production now should be adjusted accordingly with the EU's production quota allocation mechanism among member countries²¹. Hence, Turkey should reduce beet production to approximately about 8.4 % of total production in the EU.

4.2. Scenario 2: Turkey acts in accordance with WTO-partial but gradual liberalization

In this scenario it is aimed to reduce distortions and to remove excess supply/demand in the market in accordance with the WTO. This scenario involves a relatively lower and/or slower level of liberalization compared to scenario 1. In 2007, per ton producer prices are expected to fall only down to 43600 Euro (Turkey adopts EU 2004 beet price in 2007 which yields 28 % reduction in support price in Turkey compared to 2004) resulting in a relatively higher (compared to scenario 1) nominal protection rate of 2.7. Based on the new production and import levels, a reduction in production quota in Turkey is expected and a reduction in import tariffs to fill the excess demand is also expected.

4.3. Scenario 3: No government intervention in domestic market-partial liberalization in border policies

In this scenario, sugar beet is considered as a special crop in Turkey and policy instruments included in the "blue box" category of the WTO are allowed. The main aim is to terminate all distortions in the domestic beet market. Intervention price is removed and production quotas become redundant. A partial liberalization in imports is foreseen, in accordance with WTO that reduces nominal protection rate down to 1.2 and import tariffs from about 138 % to 85 %. The new border price, which is adjusted just to cover the production cost, is adopted as the producer price in the domestic market and it is announced as the target price by government.

In the first two scenarios, the effects of new producer price in Turkey are simulated via the use of both support purchasing and deficiency payment systems as policy instruments. The policy analysis regarding the first two scenarios aims at finding the transfer efficiency and welfare effects of the two policy instruments in a comparative way. Hence, the same price is used as the intervention and target price in the 1st and 2nd scenario, respectively. In the third scenario, the new producer price is announced as target price by government, therefore the simulation considers only deficiency payment system.

5. Empirical findings

A comparative static analysis was carried out to evaluate the effects of alternative policy scenarios only in the short-run (year 2007)²². Simulation outcomes are presented in Tables 4 and 5 below and the outcomes are ranked by using weighted Goeller Scorecard²³ matrix, presented in Table 6. Results of simulations are summarized under six sub-headings which involve the findings regarding the net trade effect, transfer efficiency, effect on government budget, change in net farm revenue, net welfare effect in the economy and change in leakages from the farm.

Transfer Efficiency. There is only a slight difference between the two support systems in terms of the measured transfer efficiency. Within the scenarios, out of each US\$ 100 the amount of support that is received by farmers change in the range of US\$ 28-33. The purchased inputs are the main source of income leakages from the farm, and this is followed by rented land and hired labor force (Table 5). In general, deficiency payment system seems to be more efficient. Since the calculated income component or the change in farm revenue is the same under both systems, the rise in transfer efficiency under deficiency payment system occurs due to the lower level of policy cost (Table 5). The fall in total gross revenue and in net revenue for both farm-owned and non farm-owned factors is larger in the 1st sce-

²¹ According to the European Union's production quota system, after partial liberalization, beet production quotas in member countries will be reduced at the rate of fall in beet production in each country.

²² Previous analysis regarding welfare effects of alternative policies in Turkish agricultural sector can be found in Cakmak et. al (1998) and Demirci (1998).

²³ Dye (2002).

nario and this is followed by 2nd and 3rd scenario respectively, which is directly related to the fall in producer price and resulting decrease in production. For the same reason, the fall in taxpayer cost is larger in the 1st scenario and smaller in the 3rd scenario.

Change in Net Farm Revenue. The change in net farm revenue is based both on the fall in producer price and resulting fall in supply, and on the share of farm-owned factors of production and their supply elasticity. The share of farm-owned land and labor in total is about 73 % and 95 % respectively (Table A1). While supply of farm-owned land is inelastic (0.30), supply of farm-owned labor has unitary elasticity. Therefore, the disincentive created for beet producers with the reduction in producer price, at the same time results in farm-owned factors and particularly labor to become redundant. The change in net farm revenue does not differ among the two systems but it does between sce-

narios based on the level of price fall. When the fall is sharp as it is in the 1st scenario, then the fall in production and total revenue is greater, and the resulting decrease in farm revenue is higher.

Effect on Government Budget. The effect on government budget is related to the intervention price and to the amount of production that the government wishes to purchase. Import tariffs may also compose a significant part of the budget revenues. Since in Turkey a significant part of beet production is purchased by T.S.F.A.S., under support purchasing system in the scenarios, it is assumed that government purchases all the production from the intervention price. However, under deficiency payment system only the price difference between target and reference price is paid to the farmer. Therefore, the burden on budget is lower under deficiency payment system compared to support purchasing system. The differential between reference and producer

Table 4. Welfare effects

| Welfare Effects ¹ | Unit | 2007 | | | | | |
|------------------------------|----------|----------|---------|----------|----------|----------|----------|
| | | Scen 1 | | Scen 2 | | Scen 3 | |
| | | SP | DP | SP | DP | DP | DP |
| Consumer surplus | 000 Euro | -176.448 | - | -411.209 | - | - | - |
| Producer surplus | 000 Euro | 91.421 | 91.421 | 263.259 | 263.259 | 336.255 | 336.255 |
| Efficiency loss ² | 000 Euro | - | -6.263 | - | -38.574 | -56.903 | -56.903 |
| Import tariff revenue | 000 Euro | 76.983 | 80.544 | 100.453 | 118.300 | 92.701 | 92.701 |
| Cost of support purchases | 000 Euro | -294.126 | - | -520.154 | - | - | - |
| Cost of stocking | 000 Euro | -29.413 | - | -52.015 | - | - | - |
| Cost of deficiency payments | 000 Euro | - | -97.684 | - | -301.832 | -393.158 | -393.158 |
| Over quota payments | 000 Euro | - | - | - | - | - | - |
| Effect on government budget | 000 Euro | -246.556 | -17.140 | -471.716 | -183.532 | -300.457 | -300.457 |
| Net effect on the economy | 000 Euro | -331.583 | 68.017 | -619.666 | 41.153 | -21.105 | -21.105 |
| Domestic supply | 000 t | 10.735 | 10.735 | 11.930 | 11.930 | 12.402 | 12.402 |
| Domestic demand | 000 t | 19.194 | 19.586 | 15.901 | 16.606 | 15.327 | 15.327 |
| Net trade | 000 t | -8.460 | -8.851 | -3.970 | -4.676 | -2.924 | -2.924 |

1: Welfare effects refer to gains and losses of the agents in the year 2007.

2: Efficiency changes in the support purchasing system are included in consumer and producer surplus.

Table 5. *Transfer efficiency analysis*

| Transfer Efficiency Effects | Unit | 2007 | | | | |
|---|---------------------|--------|-------|--------|-------|--------|
| | | Scen 1 | | Scen 2 | | Scen 3 |
| | | SP | DP | SP | DP | DP |
| <i>Change¹ in production revenue</i> | <i>million Euro</i> | -472 | -472 | -265 | -265 | -170 |
| <i>Change in farm-land gross income</i> | <i>million Euro</i> | -43 | -43 | -24 | -24 | -15 |
| <i>Change in rented-land gross income</i> | <i>million Euro</i> | -6 | -6 | -3 | -3 | -2 |
| <i>Change in farm-labor gross income</i> | <i>million Euro</i> | -195 | -195 | -110 | -110 | -70 |
| <i>Change in hired-labor gross income</i> | <i>million Euro</i> | -1 | -1 | -0,3 | -0,3 | -0,2 |
| <i>Change in purchased inputs gross income</i> | <i>million Euro</i> | -176 | -176 | -99 | -99 | -63 |
| <i>Change in farm-land net income</i> | <i>million Euro</i> | -33 | -33 | -18 | -18 | -12 |
| <i>Change in rented-land net income</i> | <i>million Euro</i> | -4 | -4 | -2 | -2 | -2 |
| <i>Change in farm-labor net income</i> | <i>million Euro</i> | -98 | -98 | -55 | -55 | -35 |
| <i>Change in hired-labor net income</i> | <i>million Euro</i> | -0,3 | -0,3 | -0,2 | -0,2 | -0,1 |
| <i>Change in purchased inputs net income</i> | <i>million Euro</i> | -98 | -98 | -55 | -55 | -35 |
| <i>Change in net farm revenue</i> | <i>million Euro</i> | -130 | -130 | -73 | -73 | -47 |
| <i>Change in leakages from the farm</i> | <i>million Euro</i> | -102 | -102 | -58 | -58 | -37 |
| <i>Change in taxpayer cost</i> | <i>million Euro</i> | -85 | -392 | -71 | -237 | -154 |
| <i>Change in costs to consumers</i> | <i>million Euro</i> | -318 | - | -183 | - | - |
| <i>Transfer efficiency</i> | | 0,323 | 0,333 | 0,289 | 0,305 | 0,309 |

¹. Absolute change with respect to 2004 values.

price, and the resulting imports have a key role in comparing budget effect in different scenarios. Compared to the 2nd and 3rd scenarios, in the 1st scenario both price differential and tariff revenues are at lower levels (Table 4). When outcomes of deficiency payment system are compared, the 1st scenario yields a lower cost to the budget, and the 3rd scenario yields the highest. If support purchasing system is considered, the budget cost in the 1st scenario is lower compared to the 2nd scenario.

Change in Income Leakages from the Farm. The main source of leakages is the use of purchased inputs in beet production and the share of it in total cost. This is followed by rented land and hired labor force. All the inputs other than primary factors of production are assumed to be purchased and their share in total production cost is about 37

%. Leakages do not differ between deficiency payment and support purchasing systems. However, among scenarios leakages differ which is dependent on the amount of change in production. Therefore, leakages fall as the price differential between world and domestic price goes up. Since price differential is highest in the 3rd scenario, leakages tend to be smaller (Table 5).

Net Welfare Effect on the Economy. The results regarding the net welfare effect is quite mixed. While support purchasing system results in a loss to the economy in the 1st and 2nd scenario, deficiency payment system yields a surplus in the 1st and 2nd scenario but a loss in the 3rd scenario. In general, the loss/surplus increases/decreases as the difference between reference and intervention/target price rises. The key factors behind this loss are the change in consumers'

Table 6. Comparison of scenario outcomes

| Goeller Scorecard ¹ | Deficiency Payment System | | | | | |
|---------------------------------------|---------------------------|--------|------|--------|------|--------|
| | | Scen 1 | | Scen 2 | | Scen 3 |
| Transfer efficiency (6) | 3x6= | 18 | 1x6= | 6 | 2x6= | 12 |
| Change in net farm revenue (5) | 1x5= | 5 | 2x5= | 10 | 3x5= | 15 |
| Effect on government budget (4) | 3x4= | 12 | 2x4= | 8 | 1x4= | 4 |
| Change in leakages from the farm (3) | 1x3= | 3 | 2x3= | 6 | 3x3= | 9 |
| Net welfare effect in the economy (2) | 3x2= | 6 | 2x2= | 4 | 1x2= | 2 |
| Net trade effect (1) | 1x1= | 1 | 2x1= | 2 | 3x1= | 3 |
| Total score | | 43 | | 36 | | 45 |

¹ Values in parentheses represent the corresponding weights.

Source: Calculated by using the findings in Table 4 and 5. See Dye (2002) for Goeller Scorecard method

welfare and cost of policy instrument to the government. In the 1st and 2nd scenario, the fall in consumer surplus more than offsets the rise in producer surplus and the burden on government budget increases as the price gap between world and intervention price rises (Table 4). Although deficiency payment system has no effect on consumer surplus, in the third scenario the budget cost and efficiency loss in the economy more than offset the rise in producer surplus and yields a loss in the economy. As mentioned before, among all, budget cost is the highest (due to the high rate of price differential) in the 3rd scenario.

Net Trade Effect. Because of the sharp fall in producer price in the 1st and 2nd scenario, an excess beet demand in the market occurs, due to the rise in demand and fall in supply. The fall in supply in the 1st and 2nd scenarios is about 19 % and 10 % respectively compared to 2004. Therefore, the country becomes a net importer under both scenarios however the amount of imports is larger in the 1st scenario because of the larger fall in producer price (Table 4). In the first scenario, a problem may arise if the resulting production is above 8 % (production quota assumed to be allocated for Turkey) of production in the EU. Comparing the two support systems, the amount of imports under deficiency payments is larger due to the lower world price from which the consumer continues to demand. In the third scenario, reduction in tariff rate results in a rise in imports and the country becomes a net importer again. Turkey adopts the importer price (adjusted with the lower tariff rate) in the domestic market and domestic supply of beet goes down because of this lower price. The decrease in tariff rate is used here as a tool to reduce the producer price just to cover production cost. The fall in supply is about 6 % and therefore the amount of imports is lower compared to the first 2 scenarios.

In Table 6 the outcomes of the Goeller Scorecard method is presented. The criteria used in grouping and explaining the scenario findings are also used in Goeller Scorecard.

The corresponding weights for each criterion are ranked according to the emphasis of the study²⁴. With regard to policy instruments to be implemented in the agricultural sector, the very hot topics in the agenda for long years are the transfer efficiency and cost of alternative policies. The ranking of the criteria in Table 6 was done by considering this fact above. The Table covers only the findings regarding the deficiency payment instrument since it is simulated under each scenario. Obviously the Table favors the third scenario however the Table represents a trade-off as well. The trade-off is between the budget cost and net farm revenue of the policy instrument. If the former goes down, the latter goes down too and vice versa. In addition, net welfare effect moves together with budget cost and leakages from the farm move in opposite direction with net farm revenue.

6. Conclusion

In this study, an economic impact assessment, which considered short-term developments in the WTO, CAP, as well as domestic economic constraints in Turkish economy, was achieved to find the impact of “deficiency payment” and “support purchasing” systems in sugar beet/sugar markets²⁵.

The evaluation of the findings in different scenarios should consider various sectoral and intersectoral aspects. The first aspect to be considered arises with the compensation of the farmers' revenue loss due to the fall in prices and production. Adoption of EU's price in Turkey creates the largest loss in revenue, compared to the 2nd and 3rd scenarios. In this case, the question is whether this loss will be compensated by EU or Turkish funds. If Turkey adopts CAP before becoming a full member, therefore the answer will be the latter, which will put an extra burden on government budget. The level of compensation itself may be an incentive/disincentive for production as well.

With regard to the 1st scenario another important aspect to be considered is the resulting level of production after the price fall. If it is higher than the allocated quota level by the EU, then there should be a further decrease in production and this would obviously increase the extra cost to the government mentioned above.

Another aspect is the excess labor and land that come about as a result of the decrease in production and which seems to be higher in the 1st scenario. In the short run, mobility of these resources to a sector other than agriculture is quite difficult. Shifting them to the production of an alternative crop seems to be a rational solution. However, an incentive should be created for the farmers for shifting them to alternative cropping. Otherwise, the alternative cropping policy can be unsuccessful due to the higher potential to create value added in beet/sugar market compared to other crops. On the other hand, this incentive would also put extra burden on the budget. Nevertheless, providing an incen-

²⁴ Caution should be given since the ranking obviously involves a bias, and if the order of the emphasis changes, the total score and final ranking may change.

²⁵ It has to be mentioned that one of the major constraints regarding this market in Turkey (a limitation of this study) arises with the political expectations shaping the policy framework rather than the economic and social expectations.

tive would be preferable since in this way the farmers' compensation problem will be solved and there would be no extra pressure on unemployment. Creating an incentive seems also a better alternative than providing payment for setting-aside the beet areas.

The demand of sectors/industries which use beet/sugar as intermediate inputs for production such as food industry and livestock production is another aspect to consider. Due to the relatively higher prices of artificial feed, beet pulp becomes quite important particularly for livestock producers as it constitutes the significant part of animal feed. Depending on the demand elasticity, a necessity for extra imports may arise which would result in further reduction of import tariffs. The effect of this rise in imports and fall in tariffs would be twofold. There would be a loss in government revenues and an increasing pressure on trade deficit of the country. The trade deficit in Turkey has become a persistent problem for years, reflected with 65% export/import compensation ratio, and this may put pressure on exchange rate. One final point is that government will be free of providing huge amount of export subsidy as a result of these alternative policies, which would help for budget deficit to go down.

Currently, Turkey is at the "turning point" and because of its macroeconomic constraints and international developments, cannot continue to support purchasing system; instead Turkey should begin to discuss alternative support policies such as deficiency payment, premium or direct income support systems.

In conclusion, the suggested alternative is that Turkey should declare sugar beet as its "special product" in WTO negotiations. Other policy alternatives result in huge revenue loss for producers and for a significant amount of people who survive in this sector. If sugar beet is accepted in the "special product" category, then current support can be provided through government-announced target price (deficiency payment system) which can reduce excess supply gradually (so beet producers can have a chance to adjust) and in the longer run Turkey may provide only direct income support to beet producers without harming those producers. The production quotas can become redundant in the short to medium run; with the fall in excess supply the necessity to provide export subsidy would go down too. In this way, the conflict with the WTO regarding these policies are removed. Related to the discussions above, the group of farmers that experienced a higher net income rises due to the implementation of deficiency payment system and the income groups in the economy that take most of the financial burden of deficiency payment system should be revealed as the two last sector and economy-wide effects.

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