Agricultural policy (AP2011) Reform and the WTO: Potential Impacts on Swiss Agriculture

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Abstract

This article analyses the impact of the planned Swiss package of agricultural policy measures AP2011 and the tariff reductions scheduled as part of the WTO Doha Round, with special emphasis on effects in the dairy and meat sector. The simulations are carried out using an extended partial equilibrium model. This article discusses the anticipated impact of changing structural conditions on production, processing, consumption, prices and exports in the milk market. If account is taken of the Bilateral Agreements between Switzerland and the EU providing for liberalisation of the common cheese market, raw milk production increases by 10.5 %, whereas the milk price shows a significant drop to around 60 centimes per kilogram of milk. The abolition of subsidies will result in comparatively more milk being processed into high value-added products. All WTO scenarios have a negative impact on the dairy and meat market. The results reveal that Pork meat is sensitive to the tariff reduction formula under the WTO draft proposal.

Key words: Partial equilibrium model, simulation, AP2011, WTO, dairy industry.

1. Introduction

The general conditions for agricultural production in Switzerland are undergoing fundamental changes. The key element of Swiss package of agricultural policy measures (AP2011) is to make a big reduction in the funds currently used for price support and to switch them to direct payments. Export subsidies are completely abolished and funds for internal market support more than halved. The abolition of milk quotas and the reduction and transformation of the milk market support as anticipated in agricultural policy 2011 will significantly affect the milk market. On the other hand, the agricultural sector will be influenced by possible liberalisation in the course of WTO negotiations. A further opening of Swiss agricultural market must be expected due to the conclusion of the WTO Doha Round, further bilateral agreements with the EU as well as agricultural free trade or free trade agreements with other countries.

The purpose of this working paper is to estimate the potential impact of AP2011 reforms and alternative proposals to liberalize market access within the broad guidelines provided by the July 2005 Framework Agreement for the Doha Development Agenda, with special emphasis on effects in the dairy and meat sector. The simulations are conducted using a recursive dynamic partial equilibrium-modelling tool with behavioural functions for activity levels, input demand, consumer demand and processing. Specification of individual policy instruments in the model allowed the impact of individual reforms to be examined separately and simultaneously in order to evaluate which policy interventions most influence domestic prices and trade in the strongest way. Two important policies for the sector tariff-rate quotas (TRQ) and production quotas are modelled explicitly. TRQs operate as two-tier tariffs that combine both tariffs and quotas (Skully, 2001). A relatively low tariff applied to a fixed quantity of imports is coupled with higher tariffs for imports above that quantity.

In the following section describes the model used to analyse the impacts of the AP2011 and WTO. The model results are discussed in the third section. Finally, in the fourth section the paper is summarized and some conclusions are presented.

2. Model structure

This study uses an applied recursive partial equilibrium, multiple-commodity model of agricultural policy. This model examines the effects of key policy changes and trade liberalization of Swiss agricultural markets. 36 commodities are included (wheat, corn, other coarse grains, soybeans, sunflowerseed, rapeseed, sugar, soybean oil and meal, sunflowerseed oil and meal, rapeseed oil and meal, beef and veal, pork, poultry, raw milk, butter, cheese, non-fat dry milk, whole dry milk, fluid milk, and other dairy products). All commodities are treated as tradable except raw and fluid milk. It will be based on the "homogeneous product" assumption. The model is a reduced-form model with production, consumption, and other behavioural equations specified by constant-elasticity functions.

The core set of policies includes specific import and export taxes/subsidies, tariff-rate quotas (TRQs), and producer and consumer subsidies.

Supply includes farm supply of crops and animal products, processing supply of oilseed products, supply of processed dairy products, and supply of residual feed components. So far, supply has been modelled for the Swiss aggregate level. Supply is defined as effective area multiplied by yield. Supply of crops is a direct function of own and cross producer incentive prices[1] and technical progress. Animal product farm supply is a function of own and cross incentive prices, a productivity shifter, a feed cost index based on feed composition and component prices. For milk, supply includes an additive exogenous element "feed milk".

The model incorporates production quotas. For crops, production quotas are implemented as quotas on area harvested. When a quota for a commodity is binding, the producer price for that commodity in the production equation (or the area harvested equation in the case of crops) is replaced by an endogenous shadow price. The shadow price is equal to marginal cost, which is less than the producer price so long as the quota is binding. The producer price under a quota is the demand price, i.e. the price at which the commodity's demand curve intersects the quota. The difference between the producer price and the shadow price represents quota rents. Shifts in the supply curve lead to changes in the shadow price without changing production or the producer price, so long as the quota remains binding. The shadow price is equal to the producer price when the quota is not binding.

Processing supply of oilseed products is a linear transformation of processing demand for oilseeds. Supply of processed dairy products is modeled as proportional to the total quantity of raw milk processed in year t. The coefficient of proportionality is endogenous, and is a constant-elasticity function of the prices of the dairy products and the coefficient of proportionality lagged one year. With this specification, a change in the price of one processed dairy product relative to another leads to changes in the mix of processed dairy products made out of raw milk. For more details see Abler (2001).

Demand includes human demand, seed demand, processing demand, and feed demand. Human demand is a function of own and cross consumer prices, income, and population. Consumer prices are defined at wholesale level and are adjusted for any product specific subsidies. Feed demand per animal output unit, defined for each of the animal products, is a function of feed prices. Feed prices are the domestic wholesale prices adjusted for any feed subsidies. Total feed demand is defined as the sum over animals of feed demand per animal unit multiplied by animal production. In order to keep the consistency between animal production and feed demand the structure of feed demand in our model requires feed rates, autonomous feed components and own as well as cross price elasticities of feed demand. Total use is the sum of feed demand, human demand, processing demand, and seed demand.

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[1] Producer incentive prices are an aggregation of producer prices and direct payments per product unit

The systems of supply and demand elasticities used in this model are synthetic in the sense that they are not estimated as systems, but individual elasticities stem from various sources (see 3.)

TRQs can also alter the relationship between world and domestic prices in the model (Morath and Sheldon, 1999; Skully, 2001). In-quota and over-quota tariffs for TRQ commodities are treated explicitly with a discontinuity in the tariff rate at the threshold where the quota amount is reached. There are three possible regimes for a TRQ commodity:

a) Imports are less than the quota. In this case, the relationship between world and domestic prices still holds, with the relevant tariff being the in-quota tariff.

b) Imports are greater than the quota. In this case, the relationship between world and domestic prices also holds, with the relevant tariff being the over-quota tariff.

c) Imports are exactly equal to the quota. This occurs if the quota is filled but the over quota tariff is high enough to prevent additional imports. The domestic price cannot be directly determined from the world price and the tariffs in this case, as there is a range of autonomy regarding the domestic price. The difference between the domestic price and the world price plus the over-quota tariff is commonly referred to as "water" in the over quota tariff.

If a TRQ commodity is in regime 3, the model endogenously determines the domestic Price based on the quota, domestic demand, domestic supply, and exports. The model also endogenously determines the regime in which a TRQ commodity lies, so that the regime can switch depending on the scenario being analysed.

The producer price is linked to the market price by an exogenous marketing margin. For tradable, the market clearing condition requires net exports to equal zero, and for nontradables, domestic markets must clear.
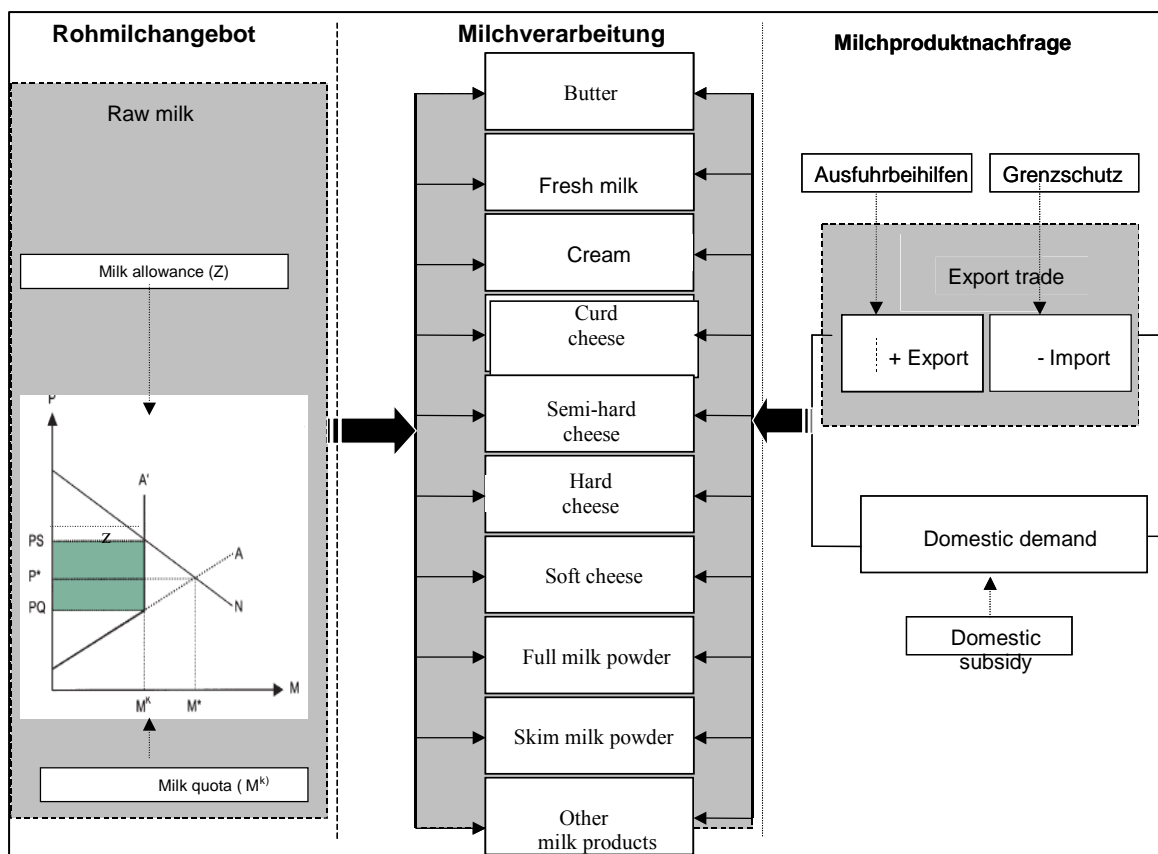
Figure 1. Chart showing the model structure for the milk sector

3. Data used and calibration of the model

The data were obtained from various sources, including the Swiss federal of Agricultural, the Swiss Federal Statistical Office, the Swiss Farmers Association and Other (Proviande). The base year data are 2003 and 2004. Base data for crops (area, yield, production, consumption, stocks, and trade) are drawn from Swiss Farmers Association, including the production, supply, and demand database. Parameters in the model come from various sources, including the Swiss Meat Market (Schluep Campo, 2004), Koch and Rieder (2002), the Food and Agricultural Policy Simulator (FAPSIM) (Gadsen et al., 1982), OECD's Aglink model (Conforti and Londero, 2001), and the ERS/Penn State model (2004). Adjustments and restrictions are imposed on elasticities to satisfy theoretical requirements such as symmetry and homogeneity in output supply equations, food/consumer demand equations, feed demand equations, and harvested acreage equations. Export and import data are available from Swiss Federal Customs Administration. The projected world market prices for the examined agricultural products are based on OECD Agricultural Outlook and FAPRI World Agricultural Outlook.

For milk production, we assume that the base-year level of milk production was at its quota, and that the shadow price for milk was 20% lower in the base year than the producer price. Bouamra-Mechemache and Réquillart (2002) report unit quota rents in various EU countries that are in the range of 30-45% of the farm price. Transaction costs associated with inter-farm quota trading should be subtracted from these rents, as should costs to producers of compliance with the quota regime and costs of managing production to avoid penalties for exceeding the quota (Bailey, 2002; Colman et al., 1998). Making allowances for these costs, we arrive at the 20% figure used here.

Most of the tariffs and TRQs in the model are from the Federal Office for Agriculture (FOAG). The model uses actual applied tariff rates rather than WTO bound rates whenever such data are available.

4. Scenarios for simulation calculations

Before the WTO simulations are carried out, a base run is conducted that represents a projection of the exogenous variables population, GDP and factor endowment up to the year 2013. This includes AP2011 instruments and the cheese free trade with UE in the middle of 2007. The milk support of the market is maintained to 2011, but continued to reduce in accordance with budget. Entirely still 437 millions Fr. or 74 % of the means of the base year are available 2004 in the year 2011. All restrictions on milk production (production quotas) are removed until 2009. Parallel to the base run, four different tariff reduction formulas are used for the projection of border protection for Swiss product. The Draft formula is from the WTO draft proposal by Crawford with a scale of 48 to 52 percent reduction in tariffs for tariff band threshold from zero to 20 percent. With the same tariff band threshold, the G1-10 formula has a 45 percent reduction in tariffs, slightly lower than the reduction scale of the Draft formula (Table 1).

WTO tariff negotiations are, however, based on bound tariffs, which result from former WTO negotiations or from the WTO accession process. These are ceilings for applied tariffs and thus represent the maximum tariff that can be imposed on imports of a particular product. The common customs tariff of Switzerland still consists entirely of specific duties. Although WTO negotiations focus on bound tariffs, the economic effects of tariff-cutting formulas clearly depend on changes in applied tariffs. For this reason it is necessary to consider both the applied and the bound tariffs available when WTO scenarios are implemented. Because Switzerland's entire tariff schedule consists of specific duties one must calculate ad valorem equivalent rates. To calculate tariff reductions[2], the bound tariffs (Tbr) are first calculated (Brockmeier et al., 2006): the reduced bound tariff (Tbr1) is then compared with the applied tariff (Tar0). If Tbr1 is greater than or equal to Tar0, no tariff reductions are implemented. If Tbr1 is less than Tar0, a disturbance in the model is calculated using formula used by Brockmeier (2006). Due to this disturbance, the Tar0 tariff is brought to the new Tar1

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[2] In each case the WTO Agreements stipulate bound tariffs for the generally 8-digit tariff lines (WTO, 2006). In this article the WTO tariff reductions are implemented on the 4-digit tariff line level

level. These rates are calculated by working out the weighted average "unit value" of imports over the period of 2003-2004. Import values and quantities are sourced from the Swiss Federal Customs Administration.

2009 to 2013 is the time window assumed for the implementation of market liberalisation. An additional basis for simulations are the general conditions relating to factor costs and direct payments assumed in accordance with the message on AP2011.

Table 1: Proposals for tariff reductions on agricultural products

Scenario 1 Falconer proposals		Scenario 2 EU proposals		Scenario 3 US proposals		Scenario 4 G-10 proposals	
Tariff rate (%)	Tariff reductions (%)	Tariff rate (%)	Tariff reductions (%)	Tariff rate (%)	Tariff reductions (%)	Tariff rate (%)	Tariff reductions (%)
> 75	70	> 90	60	> 60	85	> 70	45
> 50 ≤ 75	64	> 60 ≤ 90	50	> 40 ≤ 60	75	> 50 ≤ 70	37
> 20 ≤ 50	58	> 30 ≤ 60	45	> 20 ≤ 40	65	> 20 ≤ 50	31
0 ≤ 20	50	0 ≤ 30	35	0 ≤ 20	55	0 ≤ 20	27
Capping at 75-100 %		Capping at 100 %		Capping at 75 %		-	

Source: EUROPEAN COMMISSION, USTR, G-10, G-20, 2005 and FAPRI (2005).

5. Results

5.1 Baseline Results

Before the WTO scenarios are incorporated in the model, a base period is implemented (AP2011 measures). The result of reference scenario (AP2011) shows that Swiss milk production follows the path determined by quota increases (Figure 2) until 2008. Over the four-year period 2004 to 2008, there are only marginal changes in dairy policy and the main factors affecting the dairy industry are liberalisation of cheese market, trends in milk yields and in domestic demand for milk products.

The quota abolition, it is assumed that the quota scheme is abolished on 1 Mai 2009. At that date, all remaining domestic consumption and export subsidies are also removed. Dairy producers receive annual direct payments of 400 CHF per milk cow. These direct aids are modelled as fully decoupled transfers from taxpayers to producers. Until 2009, dairy producers freely choose their production level so as to equate marginal cost to price. In the AP2011 reference scenario the reduction of milk price support from 2009 (reduction of market support but continuation of the cheese making allowance, introduction of an RGVE contribution for dairy cattle), together with the abolition of milk quotas, causes a production increase of 10.5 per cent and a decrease in farm milk price to around 60 centimes per kilogram of milk
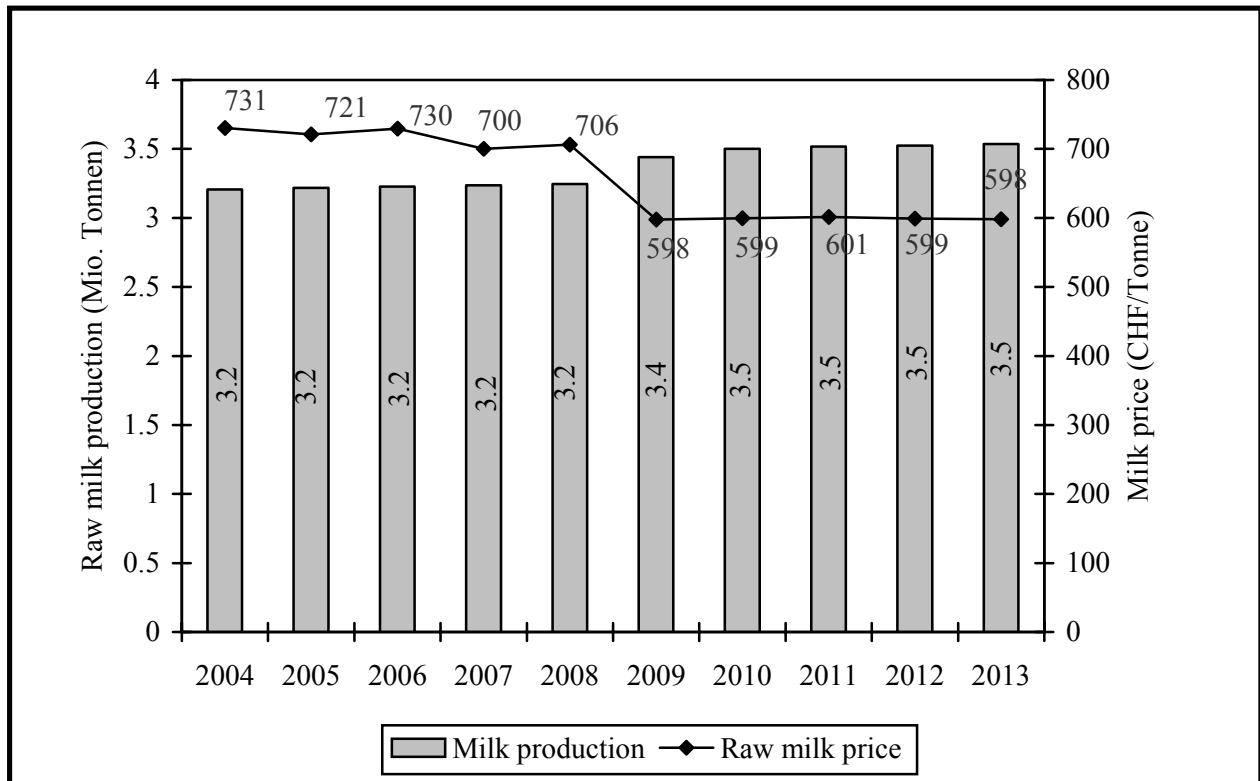
Figure 2. Price and production of raw milk in the baseline

Cheese exports into the EU and cheese imports play a major role in the development of milk prices in Switzerland. Liberalisation of the market for cheese from 2007 within the framework of the Bilateral Agreement will produce increasing competition among dairy products. The liberalisation of the cheese market and the decreasing market support in the EU lead to a rise in cheese imports into Switzerland resulting in increasing price pressure on the domestic cheese market. On the other hand, the fall in milk prices after milk quota abolition enhancing the cheese competitiveness as a result the export for hard and semi-hard cheeses increases. As is shown in Figure 3, absolute change to the base year 2004, total production of dairy products is projected to increase by approximately 10.5 % in year 2013. It is anticipated that the hitherto well protected curd cheeses and soft cheeses will be most affected. In 2013 their domestic market prices are respectively 21% and 15.8 % below the 2004 level.
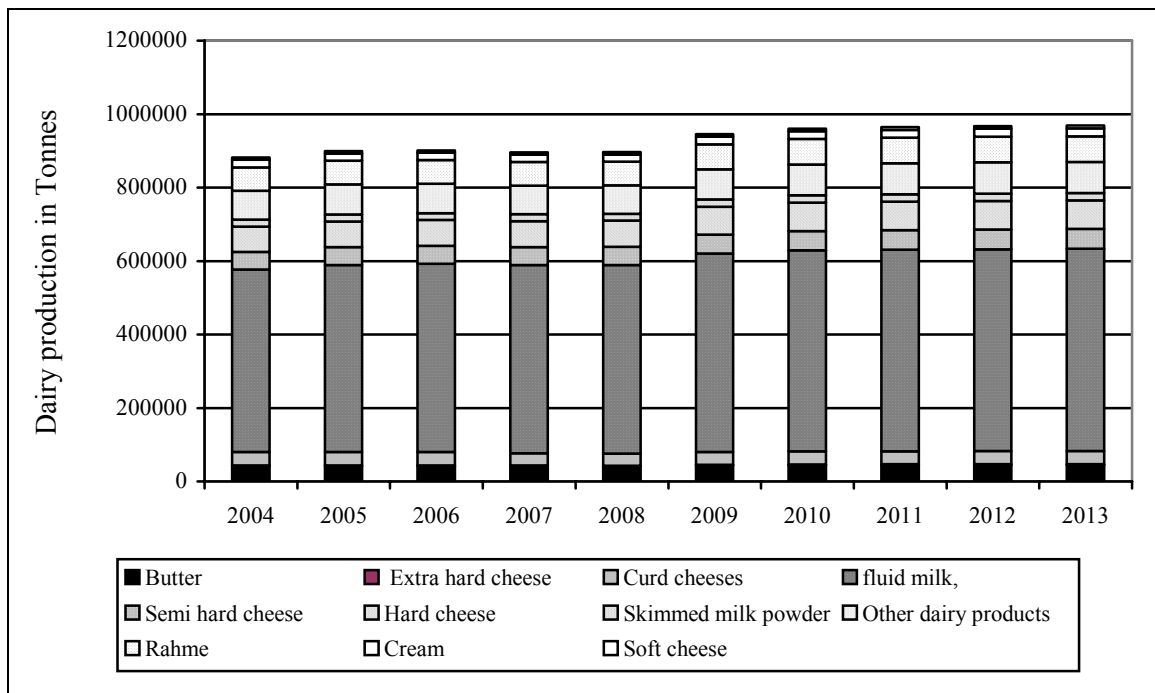
Figure 3. Changes in production for the final dairy commodities.

In the case of curd cheese, the market model shows a steady 11% decline in production from 2004 up until 2013 and -4 % until 2013 (after milk quota abolition). On the other hand, there is a significant increase in consumption and imports of both products. The situation is different for hard cheese: exports can be increased by 34.6 percent to 49000 tonnes (see figure 4). Liberalisation of the cheese market not only affects cheese, but also has an impact on the production of butter, cream and skim milk powder. This effect is reinforced by the abolition of milk quotas from 2009 and the reduction of subsidies for the production of white line products. The previously promoted utilisation of raw milk for butter and skim milk powder ceases to be attractive. With the continuation of the cheese allowance, utilisation tends to move towards cheese (hard cheese and semi-hard cheese). On the whole the base period (AP2011) leads to a rise in milk production, reflected in the increasing production of semi-hard and hard cheese, full milk powder and a few other milk products. In principle milk products ought to be cheaper, as procurement costs for the milk raw material fall as the price of milk drops. However, a reduction in the price of the milk products thus far supported (cheese, butter, milk powder and skim milk powder) can only be expected when the cost savings produced by lower milk prices and rationalisation exceed the fall in receipts caused by the abolition of support funds. Despite possible lower prices in the liquid milk, fresh milk product and liquid cream sub-markets, consumption increases only slightly. This is due to low price elasticity of demand.

According to meat production, the main factor influencing medium-term projections on the meat sector is the developments in the dairy sector combined with a reduction of the threshold price for imported animal feed (feed grains and protein feed). In order to increase the competitiveness of Swiss

meat and egg producers, the AP2011 agricultural policy reform programme provides a reduction of the threshold price for imported animal feed (feed grains and protein feed) in 2009 around 7 CHF/100kg. Further, developments in the dairy sector influence the beef & veal market. With a declining price of milk and increasing the milk production, some producers will switch to beef and pork production. In the case of beef, the market model shows a steady 2 % increase in production from 2004 up until 2011.
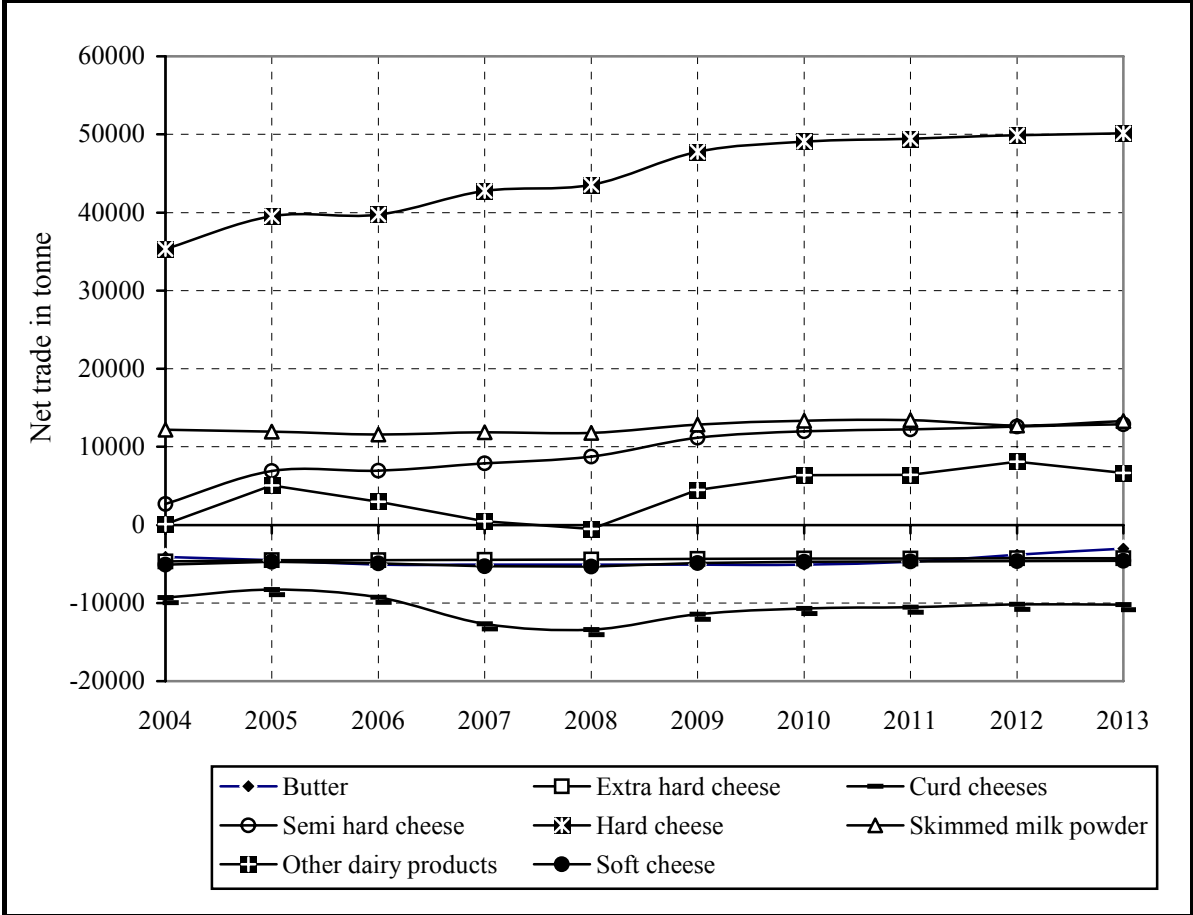

Figure 4. Changes in net trade for the final dairy commodities.

5.2   Results from simulating the WTO scenarios

The results of the four WTO scenarios are given in the form of percentage changes relative to the base period (AP2011). The changes in milk, dairy and meat production are shown in Table 2. Irrespective of the width of the bands (Tab.1) and the order of magnitude of tariff reductions, all the scenarios from 2009 onwards result in a significantly increased negative trend in the price of raw milk. If the G-10 proposal with the least tariff reductions and no capping is implemented, the price of milk in 2013 drops by –0.2 % compared with the reference scenario. If the very high tariff reductions put forward by the US are applied, the price of milk even falls by 2.1 %.

The highest negative changes in dairy production by comparison with AP2011 take place for butter, skim milk powder and liquid cream. For butter this reduction of production is between 28.4% and 11.5%, for skim milk powder between 0.7% and 3.8%. On the other hand other milk products, particularly semi-hard, hard and extra hard cheese, show a slightly negative change in supply. Across all scenarios raw milk production shows a relatively uniform decrease in output volume in the order of approx. 0.5% to 2.1%.

In the case of meat sector, the results of the model reveal that TRQ cutting improve market access only if TRQs are binding, i.e. when imports approximately match the quota level. In the case of pork the TRQ is not binding, imports occur regularly out-of-quota. Compared to beef, veal and poultry, the protection afforded to pork is relatively low. There is no gab "air" between the price for domestic pork and the import value plus the out-of-quota tariff. The non-binding TRQ for pork implies that already a one percent cut in the out-of –quotas tariff will impact pork imports and eventually domestic production. Table 2 shows that a cut in the out-of-quota pork tariff impacts the proportion between domestic production and imports. Under the WTO scenarios, pork meat supply is expected to decline by 13.3 % relative to the base period (AP2011). Conversely, already a 1 % cutting the out-of -quota pork tariff results in a 4.2% increase in imported pork quantity. Beef meat TRQs are binding, i.e. imports approximately match the quota quantity. The domestic product price is situated somewhere in between a lower and an upper bound price. Depending on how far the respective domestic product price is from the upper bound level, there is a range where a cut in the out-of-quota tariff has no effect on the domestic price and imports. Only when the "air" is squeezed out, additional market access is given. For beef this "air" in the out-of-quota tariff is 40.6% and for poultry 62.1%.

Table 2. Meat and Dairy commodities, change from the baseline scenario (%)

Products	EU proposals	US proposals	Falconer proposals	G-103 proposals
Beef meat	-0.4	-0.6	-1.0	0.1
Butter	-25.6	-27.9	-28.4	-11.5
Specially hard cheese	-1.2	-1.5	-2.2	-0.7
Curd cheeses	3.0	2.8	-1.3	4.9
Fluid milk	-0.9	-1.2	-1.9	-0.4
Semi hard cheese	-0.9	-1.3	-2.2	-0.3
Hard cheese	-1.2	-1.4	-2.1	-0.6
Veal meat	1.0	1.4	2.0	0.0
Raw milk	-1.1	-1.4	-2.1	-0.5
Skimmed milk powder	6.4	7.1	6.4	2.2
Other dairy products	6.4	7.1	6.4	2.2
Poultry	1.8	2.6	3.6	-0.1
Pork	-6.9	-9.8	-13.3	-0.3
Cream	-1.6	-2.4	-5.4	-0.9
Full milk powder	6.4	7.0	6.4	2.2
Soft cheese	-0.8	-1.3	-2.1	-0.2

Source: Own calculations

[3] Members are: Bulgaria, Chinese Taipei, Iceland, Israel, Japan, Korea Republic, Liechtenstein, Mauritius, Norway and Switzerland.

6. Conclusions

This article investigates the impact of the abolition of milk quotas, the withdrawal of market support and redistribution of the funds thereby released as direct payments, with special emphasis on effects on the milk sector. In these measures provided by AP 2011, the domestic market equilibrium is directly influenced only by an allowance for milk made into cheese. Taking account of the Bilateral Agreements between Switzerland and the EU, which provide for the liberalisation of the common cheese market, raw milk production increases by 10.5 % while the producer price falls significantly to around 60 centimes per kilogram milk. The abolition of subsidies means that comparatively more milk will be processed into high added-value products. All WTO scenarios have a negative impact on the milk market. The effects of these Agreements will be reflected in lower milk prices, so that in 2013 the producer price could be only 58 centimes per kg (US proposal). Compared with AP2011, this price trend leads to cuts in production and slightly increased demand in Switzerland. The trade balance in the milk products sector becomes distinctly positive. The results reveal that Pork meat is sensitive to the tariff reduction formula under the WTO draft proposal. There is no "air in the pork out-of-quota tariff. A tariff cut has an immediate effect on the quantity of pork imports. With the USA proposal tariff cutting the domestic price of pork meat will be reduced by 30.1% and the production level by 13.3%. In contrast, there is small or no effect on market access for the binding TRO's for beef, veal and poultry meat. All have "air" between the domestic price and the upper bound import price.

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