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# **"Economic analysis of the effects of the expiry of the EU milk quota system"**

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## **EXECUTIVE SUMMARY**

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## **Executive Summary**

This report has been prepared to provide a quantitative assessment of the impact of the abolition of EU milk quotas on the EU dairy sector, including the different policy approaches of gradual phasing out and abrupt abolition of milk quotas.

### ***Background on the modelling framework***

This study relies on the integrated use of a model which takes into account the whole dairy chain, starting upstream from primary milk production and ending downstream with consumer demand for processed dairy products. At the primary supply level the model takes into account that milk is produced using a dairy cow herd, (compound) feed and roughage feed, among which grass from pasture land. The primary supply model also recognizes that milk and beef might be jointly produced and also takes into account beef output. The supply model also takes overtime improvements in milk yields into account. On average over the period 2008-2020, milk yields (autonomously) increase by 1.03% and 1.21% per annum for the EU15 and EU10 respectively. These yield increases, which vary over countries, are based on empirical estimates. As regards the policy side, the milk quota policy is taken into account with respect to national quota levels and fat correction to deal with actual fat composition of milk. In case of binding milk quota this implies that an estimate of the value of the quota rent has to be used (see more detailed discussion below). Also the direct payments received by dairy producers, which are considered to be fully decoupled, are accounted for.

To deal with the downstream part of the dairy chain, a processing model is used which accounts for the processing of raw milk into fourteen final dairy products, thereby taking into account that milk and milk products consist of fat and protein and that balances for these components should hold. Distinguished products are Butter, Skim Milk Powder, Whole Milk Powder, Casein, Condensed milk, Liquid milk, Cream, Fresh products, and six categories of cheese: Fresh cheese, Semi hard cheese, Hard cheese, Blue cheese, Soft cheese and Processed cheese.

The demand for final products is modelled for the EU as well as for the rest of the world. As regards the rest of the world four net importing regions are distinguished: CIS (Commonwealth of Independent States) and the rest of Europe (including Turkey), Asia, Africa and Middle East countries, and America. The estimated demands for milk products in the EU and rest of the world (RoW) taking into account autonomous shifts in demand are based on previous empirical estimation work. Over the period from 2008 to 2015, at the EU25 level, the annual increase in fat and protein demand is respectively 0.1% and 0.5%. The demand for imports in the RoW is assumed to increase by 2 to 3% per year depending of the products. In addition to the 4 importing zones, the model also includes a net exporting zone: Oceania. The net supply of dairy products from New Zealand and Australia is modelled. Then dairy products from Oceania are competing with EU exports to fulfil the demand from the 4 importing zones.

In addition to the already mentioned milk quota instrument and direct payments, which hold at the primary sector level, the policy instruments considered with respect to the final products are price support measures as well as border measures. Price support includes: minimum prices for Skimmed Milk Powder (SMP) and butter, consumption subsidies for SMP and butter, and production subsidies

for casein. Border measures consist of import duties (for the EU as well as importing areas), tariff rate quotas (TRQs), and export refunds (including the WTO commitments on the volume and the value of subsidized exports).

Focusing on the EU, the geographical coverage of the model is the EU27, where the level of detail varies over the EU15, EU10 (new member states that joined the EU in 2004) and the EU2 (Bulgaria and Romania, which entered the EU in 2007). Except for Luxemburg (which is included in Belgium), all EU15 member states are represented at individual level. As regards the EU10 Poland, Hungary and Czech Republic are represented at individual member state level, whereas the remaining 7 countries are presented at an aggregate level (EU7).

### ***Quota rent estimation and assumptions***

Milk and dairy products markets are strongly influenced by the quota system. By restricting milk production, the quota system is a way to sustain prices. The key question we have to solve here is thus how the milk production in the different countries will vary if quotas are removed or expanded and what will be the price effects. As is explained in the report a key issue in this respect is the initial height of the quota rents, or its mirror side, the marginal costs of milk production. The marginal costs are estimated using the following synthetic 'estimation' procedure.

First, empirically estimated marginal costs are available for the year 2000 and with different length-of-runs. Because the focus is on the long (or intermediate) run rather than the short run, the long run marginal costs were chosen as the reference case. Since these marginal costs are a function of the costs of inputs, such as for example feed, other output prices (beef) and technical change, using information on actually observed changes in input and output prices over the period 2000 till 2005, updated marginal costs for the year 2005 were simulated.

Next, the simulated marginal costs were reconsidered in the context of recent quota market information (quota price in 2005 to 2007). For this, information on quota prices as well as information on the particularities with respect to implementation of the milk quota regime in various member states were assessed (e.g. possibilities and limitations with respect to tradability of quota). Based on this analysis it was concluded that for the modelling exercise the UK, Sweden, Hungary, as well as the EU7 are considered to be structurally under-fulfilling their respective quotas, meaning that there is no quota rent associated with these Member States and therefore their raw milk prices equal their marginal costs. All other member states (excluding Bulgaria) face binding milk quota during the 2005 base year. Because an inherent uncertainty remains with respect to the determination of marginal costs of milk production and because there might be a debate about the proper length of run that has to be considered, it was decided to make this parameter subject to a sensitivity analysis.

### ***Baseline and scenarios***

The baseline for the analysis provided in this report is the policy as defined in 2003 (Luxemburg agreement). The main elements of this policy include a cut in intervention prices, an increase in milk production quota and direct payments based on past allocation of quotas. The baseline is defined over the period 2005-06 to 2015-16. Although a discussion of the period 2005-06 to 2007-08 is

provided, the focus of the subsequent analysis is on the period from 2008-09 to 2015-16. To provide an insight into the very long run, the report provides additional results for the year 2020-21.

The analysis considers the four following scenarios:

- Phasing out quotas: 1% annual quota increase from 2009-10 to 2014-15; quota removal in 2015-16; this scenario is named Q1.
- Phasing out quotas: 2% annual quota increase from 2009-10 to 2014-15; quota removal in 2015-16; this scenario is named Q2.
- Quota Removal in 2009-10; this scenario is named QR-09.
- Quota Removal in 2015-16; this scenario is named QR-15.

Baseline and scenarios only differ by the level of quota or the existence of the quota system. All the other elements of the policy mix are identical.

### ***Baseline scenario: RESULTS***

At the EU level, the main element is the increase in the demand for protein which implies an increase in the SMP price. In contrast, the EU demand for butter decreases over time while the aggregate demand for fat marginally increases. At the beginning of the period the price of butter is greater than the intervention price. The decrease in butter demand generates a slight decrease in the domestic price of butter. However, as it is the case for SMP, the domestic price of butter remains larger than the intervention price. Thus both SMP and butter domestic prices remain above the intervention price levels throughout the projected period. In the baseline scenario, the EU does not use any domestic or export subsidy to sustain the domestic price of dairy products. As a consequence of an increase in SMP price and a flat butter price, the farm milk price increases (about 1% a year). This increase in farm milk price induces an increase in the production of milk in countries for which the quota on milk production was not binding (Sweden, UK, EU10 countries, Bulgaria), leading to a marginal increase of about 0.1% a year at the EU level.

As regards other dairy products, due to the positive trend in their demand, the consumption of cheese and fresh products increases over time. On the contrary, the consumption of liquid milk decreases. The combination of an increase in the demand for dairy products in the EU and a stagnation of milk production due to the quota system is a decrease in the EU's exports of dairy products: EU exports, in fat and protein equivalent, decrease by 11% and 14% respectively from 2008 to 2015. This arises while a growing demand in the world was assumed. However, it should be acknowledged that the EU does not use export subsidies to sell the dairy products on the world markets.

Summarizing the Baseline scenario, the increase in the domestic demand for dairy products induces an increase in the farm milk price. As milk production quotas are not expanded, the EU milk production remains stable. The production of dairy products for final consumption increases at the expense of the production of industrial products (i.e. SMP, WMP and butter). The EU exports gradually decrease.

### ***The impact of removing quota. Comparison of dairy market situation in 2015-16***

The different scenarios of phasing out quotas lead to a similar situation at the end of the period of analysis. In absence of quotas, the EU milk collected production increases by 5.0% which causes a

10.3% decrease in farm milk price. This price decrease is relatively small and is explained by the existence of intervention price. For butter, the domestic price is equal to the intervention price and the price adjustment is modified as export subsidies (and domestic subsidies in a lower extent) are reintroduced in order to sustain the domestic butter price, which declines by 4.5% (see Table below). On the other hand, the intervention price does not play a role for SMP, as the domestic price remains larger than the intervention price, allowing a greater fall for the price of SMP that declines by 10.3%.

Situation 2015-16. Index of production, consumption and price when quota are removed (index 100= Baseline situation) and percentage price changes as compared to 2008-09.

	Production Index	Consumption Index	Price Index	Price Percentage change from 2008-09
Raw milk	105.1		89.7	-3.8%
Butter	110.5	101.5	95.5	-8.2%
SMP	123.4	105.2	89.7	+0.5%
Liquid milk	101.2	101.2	93.4	-1.9%
Cheese	101.8	100.8	91.7	-1.5%

2008-09 results were obtained using 'normal' market conditions

The decrease in farm milk price induces a decrease in the domestic price of all dairy products. Their consumption thus increases. However the increase in consumption remains small as EU demand is rather price inelastic and the price decline for dairy products is limited, varying from 4% to 10% depending on the product. Therefore the increase in production of dairy products induces a significant increase in the EU exports and mainly the exports of industrial products. On the whole, 80% of the additional production of fat is exported on world markets and 70% of the additional production of protein is exported, leading to a decrease in world prices.

As compared to the Baseline, producers' surplus decreases by 4 billion € as the negative effect of price decline is larger than the positive effect of production growth. Consumers benefit from the decrease in price (at EU25 level this amounts to about 3.7 billion €) while taxpayer cost is increased by the cost of sustaining the butter price. The processor surplus increases, leading to a small decline in the net welfare.

It should be noted that the decrease in producers' surplus integrates the decrease in quota rents, that affects the value of quotas as an asset (since quotas correspond to a 'right to produce'), meaning that part of the loss of surplus will be borne by owners of quota who are not always identical to the producers.

### **SOFT LANDING scenarios: RESULTS**

The two scenarios that fit in a strategy of 'soft landing' are considered to be those where quotas are increased gradually from 2009-10 to 2014-15. In scenario Q1 quota are increased by 1% per year during the phasing out period after which quota are removed in 2015-16. In Scenario Q2, the yearly increase of quota is 2%. The results of these two scenarios are very similar even if it is in scenario Q2 that the evolution of prices and production is smoother. During the soft landing period, the EU milk production gradually increases: by 0.7% per year in Q1 and by 0.8% per year in Q2.

The increase in milk production is not evenly shared among countries. In a first group of countries (Austria, Netherlands and Spain in scenarios Q1 and Q2, plus Belgium, Hungary, Ireland and Italy in scenario Q1), the increase in production is equal to the increase in quota. However, at the end of the soft landing period the quota rents are small as a consequence of the decrease in the farm milk price and the increase in marginal costs following the increase in production. In a second group of countries (UK in the case of scenario Q1; UK, Portugal and Czech Republic in the case of scenario Q2) the production decreases. This is a consequence of the negative price effect of the global increase in EU milk production. In these countries the initial quota rent was small (or equal to 0) at the beginning of the period. For these countries therefore the decrease in farm milk price thus induces a decrease in production. Finally, in a third group of countries, the increase in production is lower than the increase in quota. In these countries the quota rent at the end of the period of soft landing is no longer positive (equal to zero).

In both scenarios, removing quota in 2015-16 does not cause a sharp increase in the production. This is because quota rents at the end of the soft landing period are small on average. Thus, in 2014-15, the average quota rent amounts to 0.02 €/kg in scenario Q1 and less than 0.01 €/kg in Q2.

During the 'soft landing' period, the farm milk price remains roughly stable as the increase in demand roughly compensates the increase in production. The difference in farm milk price between these scenarios and the Baseline scenario increases over time in response to the increase in the difference of production. In 2015 the EU milk production is about 5% larger than in the baseline, whereas the EU farm gate milk price is about 10% lower than in the baseline.

During the 'soft landing' period, the SMP price remains roughly stable (Q2) as the demand for protein increases at a similar rate than the production. Since the SMP price remains significantly higher than the intervention price no export subsidies are needed to sustain the price of protein in the EU. As compared to the Baseline, the price difference increases over time.

Because more fat is produced and because fat demand increases slowly, butter price decreases. However, the decrease is relatively small as butter price reaches the intervention price in the short term (in 2009-10 for Q2 and 2011-12 for Q1). Thus from this date to the end of the simulation period, policy measures are needed to sustain the butter price. To do so, export subsidies are introduced to maintain the domestic price of butter equal to the (effective) intervention price.

As compared to the baseline, prices of dairy products are slightly lower, by 5 to 10% in 2015-16. Due to lower prices, there is some additional consumption, but the increase is limited, and so the increase in milk production is mainly exported. More than 70% of the additional production (compared to baseline) is exported on the world market. Export subsidies are used to export fat products.

The welfare impact is mainly a transfer of surplus from producers to consumers. As compared to the Baseline scenario, producers' surplus decreases by 1.9 billion € in Q1 and 2.6 billion € in Q2 on average over the period 2008-2015 while consumers' surplus increases by almost 1.8 billion € in Q1 and 2.4 billion € in Q2.

#### ***HARD LANDING scenarios: RESULTS***

As a consequence of quota removal, the production increases sharply during two years: the year where quotas are removed and the following year. The increase in EU production is about 5% with the main part occurring the first year. This is because in a lot of countries, production was restricted

by quotas and the model assumes a relatively quick adjustment. In practice, it is likely that the increase in production would occur over a longer period. The increase in production causes a rather sharp decrease in the EU milk price, by about 10%.

The increase in milk production induces a decrease in SMP and butter price. While the SMP price remains higher than the intervention price it is not the case for butter which reaches the (effective) intervention price. In absence of an intervention price policy the decrease in butter price and consequently the farm milk price would be more pronounced.

Following the two years of adjustment, the increase in production becomes lower and mainly due to the increase in demand and accompanied by a price increase. The increase in EU farm milk price is rather limited as it is only due to the increase in the protein price while the fat price remains sustained (through the intervention price of butter). As it is the case in the 'soft landing' scenarios, the additional production is mainly exported on world markets.

Likewise, the welfare impact is mainly a transfer of surplus from producers to consumers. As quota removal leads to a significant transfer of surplus from producers to consumers, an early quota removal leads to a larger decrease in the average producers' surplus over the period 2008-2015 and to a larger increase in the average consumers' surplus.

It is important to note that, for scenario QR-15, the evolution of production of the different dairy products is not smooth. Before removing quota, the production of industrial products gradually decreases while after quota removal it sharply increases. This could lead to additional adjustment costs at the processing level. It is less the case for cheese production, as prior to quota removal the production of cheese gradually increases to fulfill the increasing demand in the EU.

### ***Sensitivity analysis***

Sensitivity analysis is done with respect to export subsidies (no subsidy case), low autonomous demand growth, low marginal costs of production, and a WTO agreement including gradual phasing out of export subsidies in a 6-year period starting from 2009 as well as a gradual decrease in import tariffs over the same period.

Results are relatively stable, at least given the range of sensitivity analysis performed. Among the different cases studied, the highest sensitivity is found for the marginal cost assumption. Assuming lower marginal costs (by about 25% in average), the EU milk production after quota removal would be about 9% larger than in Baseline (compared to +5% with the standard marginal cost assumption) while the EU milk price would be 17% lower than in Baseline (versus -10% in the standard case).

The impact of the 'WTO' variant is relatively small (EU milk production and price are respectively 0.4% and 1.3% lower than in the standard case in 2015-16). This is because the positive effect from the decrease in import tariffs in the RoW partly compensates for the negative effect from the removal of export subsidies. It is worth mentioning that, in 2015-16, in the standard case only fat products were exported with export subsidies, thus the removal of export subsidies leads mainly to a change in the composition of the EU exports rather than to a significant drop in EU exports: exports of butter (and SMP) decrease (as compared to the standard case) while exports of WMP and cheese increase.

The demand-related sensitivity analysis (no subsidy, low demand) show a rather modest impact on prices as well as quantities as compared to the standard scenario.

As regards the sensitivity analysis, the results of the low marginal cost (or high quota rent) sensitivity analysis show that assumptions on quota rents significantly matter to assess the final market impacts.

### ***Concluding remarks***

From the numerous results generated from the model simulations some main patterns can be observed.

- The impact assessments of scenario Q1 and Q2 demonstrate that a gradual phasing out of quotas leads to a smoother price adjustment to a without quota situation, enabling a soft landing for producers and processors, in comparison to an abrupt removal of quotas;
- All scenarios rely on the support mechanism for butter: in general butter prices quickly hit the intervention price floor. Or, alternatively, the EU is not competitive and will remain reliant on export subsidies for butter. In the absence of production limiting quotas (and unchanged market policy measures), such a situation would lead to increased market interference by market regulators through subsidies;
- As compared to the gradual phasing out quota scenarios (Q1 and Q2), the quota removal scenarios not only generate a relatively big shock, but they also imply a more uneven development over member states. From an efficiency viewpoint the one shot-removal scenarios benefit low cost (competitive) producers. The costs of adjustment, such as exit costs, might be higher, however;
- As compared to the Baseline, all scenarios considered significantly affect the production of industrial products: as compared to the baseline where their production tends to decrease, this trend is reversed into an increase. Although not unchanged, the production patterns of products for final consumption (e.g. fresh dairy, liquid milk, cheese, etc.) show a more stable behavior;
- Since demand for dairy products in the EU is inelastic and the obtained price declines are limited, the increases in EU dairy production lead to significant increases in EU exports. Where the considered scenarios generally improve the EU's market presence through the use of export refunds (at least for butter), they also affect the world market price levels: the induced price declines on world markets are of the same order of magnitude than the price declines observed within the EU market;
- The different scenarios induce a significant shift of surplus from producers to consumers. The producers (farmers) loose and the consumers gain. Producers loose as negative price effects are significantly more important than positive quantity effects. As compared to the Luxemburg agreement the taxpayer is only marginally affected. The processors benefit from the new situation as they can expand their production. On the whole there is no significant net welfare gain to the EU because part of the potential gain is 'exported' to foreign consumers who benefit from lower dairy product prices.
- The decrease in producers' surplus integrates the decrease in quota rents as well as price effects. Because quota, which corresponds to a 'right to produce', is an asset, the decrease in quota rent will affect the value of this asset. This means that part of the loss of surplus will be

borne by owners of quota who are not always the producers. The relative share of loss that is borne by dairy producers rather than owners is variable among countries. It depends, among other elements, how the market for quota is organized, if any. The disappearance of the quota rent will ease the possibility for new producers to enter dairy production.

### ***Qualifications and discussion***

The model analysis assumes a rather quick adjustment of the dairy sector to a new equilibrium situation. In reality this adjustment process might be more sluggish (in particular relevant for the one shot-quota removal scenarios). Whereas the primary milk supply part takes into account some dynamics (adjustments in herd stocks, impact of lagged prices) it remains difficult to foresee how expectations and producer behavior will exactly adjust in the light of such a structural brake in the policy regime.

Whereas the production expansion impacts found are in general rather limited, for some countries larger expansion effects were found. It is our impression that the production increases are feasible within the current system of environmental regulations, but it was beyond the scope of this analysis to do a detailed check.

Whereas the supply model accounts for the role of quota rents, it should be noted that in the longer run also rents on other fixed factors (notably land) might adjust due to the policy changes. In the context of higher prices for crop production and fully decoupled payments, it is possible that more producers than anticipated will stop producing milk (the higher price of crops has two effects a direct one on feed cost and an indirect one on the opportunity cost of land). This may lead to an increase in milk production lower than the one simulated in this report. However, because the demand for milk is rather price inelastic this would induce higher prices for milk (as compared to those simulated) which in turn might encourage producers to increase their production. The results (in particular those relative to the quantities) thus seem robust. This is also confirmed by the sensitivity analysis.

The modeling analysis focuses on 'normalized' conditions. This implies that incidental fluctuations both at the supply side and the demand side are not accounted for by definition. However, such changes (e.g. the recent drought in Australia) might influence the actually observed market situations quite significantly. Nevertheless, in terms of our model, with its inelastic behaviour of supply and demand, 'small' shocks might easily induce strong price fluctuations. However, at the same time it underscores the need to -in an analytical sense- try to separate such impacts from the impacts generated by policy changes. In general, the policy scenario's simulated, with finally the full removal of the quota, will make the EU dairy sector more subject to world price fluctuations and volatility. In absolute values the results of this study are obviously sensitive to the conditions on the world market (as shown by the actual 2007 situation of markets). However in relative values, the results are much less sensitive as the mechanisms depicted will remain.