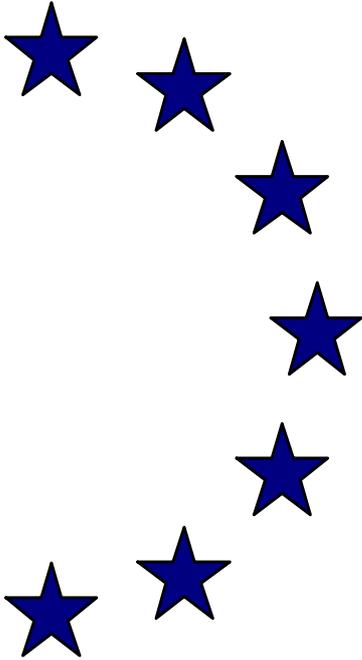


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**Economics of the Common Agricultural Policy**

by

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Directorate-General for Economic and Financial Affairs

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## Key terms used

**Annual work unit (AWU):** The total annual working time of the persons employed in agriculture is converted into AWU. The AWU is based on 1 800 working hours per year. The performance of part-time workers is converted into AWU pro rata.

**Consumption of fixed capital** (depreciation) represents the reduction in the value of the fixed assets used in production during the accounting period resulting from physical deterioration, normal obsolescence or normal accidental damage. It is the difference between gross and net capital formation.

**European Agricultural Guidance and Guarantee Fund (EAGGF):** The Fund's Guarantee Section finances, in particular, expenditure on the agricultural market organisations, the rural development measures that accompany market support and rural measures outside of Objective 1 regions, certain veterinary expenditure and information measures relating to the CAP. The Guidance Section finances other rural development expenditure (not financed by the EAGGF Guarantee Section).

**Family Farm Income (FFI)** corresponds to the payment for family fixed factors of production (labour, land and capital) and the payment for the entrepreneur's risks (loss/profit) in the accounting year. It is the GVA plus subsidies less taxes less depreciation less costs of non-family factors of production (wages, rent, interests).

A **family work unit (FWU)** refers to an AWU which is performed by farm family members (and not by hired workers).

**Gross value added (GVA)** is the value of output less the value of intermediate consumption; it is a measure of the contribution to GDP made by an individual producer, industry or sector.

**Gross domestic product (GDP)** represents the result of the production activity of resident producer units. It corresponds to the economy's output of goods and services, less intermediate consumption, plus taxes linked to imports.

**Marginal revenue product (MRP)** is the effect on revenue due to a marginal increase of input  $x$ . In the case of a single output ( $q$ ) the MRP is the value of the marginal product, i.e.  $P^*(\partial q / \partial x)$ . In competitive factor markets the price ( $r$ ) of a production factor is equal to its MRP.

The **nominal assistance coefficient (NAC)** is the value of total production at farm gate prices plus budgetary support to the value of total production at world prices. (Alternatively, it can be defined as the ratio of the border price plus the unit PSE to the border price).

**Net value added (NVA)** is the value of output less the values of both intermediate consumption and consumption of fixed capital (depreciation of e.g. buildings, machinery, vehicles, livestock, plants).

**Net domestic product (NDP)** is obtained by deducting the consumption of fixed capital from gross domestic product.

The **producer support estimate (PSE)** is an *'indicator of the annual monetary value of gross transfers from consumers and taxpayers to support agricultural producers, measured at farm gate level, arising from policy measures, regardless of their nature, objectives or impacts on farm production or income. [...] The percentage PSE is the ratio of the PSE to the value of total gross farm receipts, measured by the value of total production (at farm gate prices), plus budgetary support.'* Producer levies are taken into account. The percentage PSE is a commonly used measure to compare agricultural support across OECD countries.

The **standard gross margin (SGM)** is the difference between the standardised monetary value of gross production and the standardised monetary value of certain special costs. This difference is determined for the various crop and animal characteristics (per ha or per animal) at the level of the survey district for each Member State. By multiplying the areas or the number of animals by the corresponding SGM and then adding the products together, the total standard gross margin of the holding in question is obtained.

The **total support estimate (TSE)** differs from the PSE. It also includes support without direct income effect for the farmers (e.g. agricultural training) and is the sum of all support for the sector independent of the nature of its objective (income support, training, or environmental support etc.) and net of budgetary receipts from levies and taxes.

## **1. Introduction and Summary**

### **Introduction**

The 2003 reform of the Common Agricultural Policy has been assessed as an important reform in the right direction with respect to allocational efficiency and regarding environmental, animal welfare and food safety requirements. From an economic point of view the introduction of decoupled direct payments will reduce distortions in production decisions and, thus improve sectoral efficiency. Several papers have supported this reform: e.g. OECD (2004), KOESTER (2003), CONFORTI ET AL. (2002) and external studies for the European Commission by the Food and Agricultural Policy Research Institute (FAPRI), the University of Bonn, the Centre for World Food Studies of the University of Amsterdam (CWFS) and the Netherlands Bureau for Economic Policy Analysis (CPB).

While acknowledging and supporting these views with respect to the 2003 reform, this paper, however, tries to highlight that the overall support level for the agricultural sector remains relatively high and that most of the farm support still stems from market price support. In systematically analysing the main CAP measures and using most recent figures, it is shown that price support – together with quota restrictions and land set aside obligations – is one of the least efficient CAP instrument currently in place. Thus, the success of the 2003 reform does not allow for a position of leaning back. On the contrary, the drive of previous reforms (1992 and AGENDA 2000) with respect to bringing EU prices down to competitive levels need to be kept and perhaps even be further accelerated.

The Common Agricultural Policy (CAP) still remains one of the most important Union policies in terms of expenditures (roughly 45% of Community budget). Excluding the administrative costs, which are significant especially within the Member States, the transfers from taxpayers and consumers to the EU farmers regularly reach around 100 billion € a year. These transfers make up nearly 40% of farmers' total gross farm receipts and nearly 100% of the sectoral net value added produced. Including those support measures without direct income effect for farmers the sectoral support reaches even 116 bn €<sup>1</sup>. This support level far exceeds those for other sectors of the economy. As a consequence the rest of the economy is implicitly put at a disadvantage. This situation makes it necessary to continuously check the rationale and the effects of all policy instruments in place to assure that (a) this sectoral bias of support is well founded and justified with non-economic objectives and (b) that these non-economic objectives could not be achieved with less harmful economic effects.

In the early years of the European Community the founders signing the Treaty of Rome in 1957 already had the vision of an internal market and a political union. However, country specific and autonomous sectoral policies – like the then divergent agricultural policies – would have been counterproductive in a setting of free trade within an internal market. The specific national agricultural policies in the six founding nations left three alternatives with regard to the guidance of future agricultural policies (KOESTER, 2001, p. 310):

A) Like in the markets for other commodities, one could have dismissed all country specific sectoral policies and dismantle all trade barriers between countries. However, this was not acceptable as in the mid 1950s the differences of agricultural policies were large

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<sup>1</sup> The figure includes a) transfers from taxpayers via the EU budget (~45 bn €), b) transfers from taxpayers via the national budgets (~14 bn €; excluding e.g. national contributions to farmers' social security), and c) transfers from consumers (56 bn €) due to the wedge between EU and world market prices.

and agricultural markets highly regulated in the member countries. A regulation of agricultural markets was seen as necessary.

B) One could have excluded the agricultural sector from the integration process (as has been the case with the EFTA). This option was not plausible as some barriers to trade would have to be maintained in the internal market to control agricultural trade and consequently all other trade flows as well.

C) The third option, which was chosen, was to form a supra-nationalisation of agricultural policies in form of the CAP. Consequently, the policy integration in this sector quickly advanced and it was hoped for positive spill-over effects on the harmonisation of other policy areas. Different agricultural interests and priorities across countries, however, made it difficult in this sector to demonstrate a quick harmonisation of interests and the CAP to some extent still remains a conglomerate of national interests.

The principal objectives of the CAP have been formulated in the Treaty of Rome (Art. 33; former Art. 39) in 1957 and have not been changed since then:

*The objectives of the common agricultural policy shall be:*

- (a) to increase agricultural productivity by promoting technical progress and by ensuring the rational development of agricultural production and the optimum utilisation of the factors of production, in particular labour;*
- (b) thus to ensure a fair standard of living for the agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture;*
- (c) to stabilise markets;*
- (d) to assure the availability of supplies;*
- (e) to ensure that supplies reach consumers at reasonable prices.*

Furthermore, the Treaty (Art. 32) provides the foundation that ‘*the common market shall extend to agriculture and trade in agricultural products*’ and more generally (Art. 131) that ‘*by establishing a customs union between themselves Member States aim to contribute, in the common interest, to the harmonious development of world trade, the progressive abolition of restrictions on international trade and the lowering of customs barriers*’. The analysis of the CAP shows that these objectives have been respected to varying degrees.

For most agricultural products ‘Common Market Organisations’ exist to assure equal minimum prices and regulation in all Member States. The main policy instrument to raise farmers’ income and (originally) to boost production has been the fixing of internal market prices above world market levels with the help of import tariffs. In the 1980ies, however, for many agricultural products the EU shifted from a net-importer to a net-exporter position and being a big player in international trade the terms of trade effects switched to become negative. This shift added a burden for the EU budget to the existing burden for the consumers of paying higher prices. Instead of being a net recipient of import tariffs the budget is since then faced with the costs of public intervention and with the payments of export subsidies to manage the surplus production. In order to better control the increasing supply under the high price levels, production limits (quotas) have been introduced for several highly protected products (e.g. milk, sugar, tobacco). The CAP reforms of 1992 and AGENDA 2000 have introduced some gradual reductions of price support which are compensated by direct payments. These direct payments are linked to the various types of production. To further control the supply farmers are obliged to set-aside parts of their land (currently around 6mn ha; i.e. 8.4% of arable land). With the 2003 reform of the CAP an attempt has been made to (partly) merge the product specific direct payments for various commodities into a single farm payment which will ultimately be fully decoupled from

production of specific commodities. It will very likely have a positive effect on allocative efficiency in the sector. Furthermore, set-aside restrictions have been given the additional objective of reinforcing environmental benefits of the CAP reform, while the main purpose continues to be supply control.

Several studies utilising a CGE model find varying but significant income gains for the EU for the hypothetical case of eliminating all CAP market policies. On the high side, BORELL AND HUBBARD (2000) for instance estimated a cost of 75 bn US\$ of current CAP policies for the world, of which 49 bn US\$ are borne by the EU. PHILLIPIDIS AND HUBBARD (2001) on the other side, estimated 17.6 bn US\$ welfare gain for the EU in a scenario without the CAP in 2005. In a similar range, the IMF has estimated the income effects of a removal of the CAP to be 29 bn US\$ for the world as a whole (IMF, 2003).

### **Summary**

This paper analyses the economic effects of the main policy measures by using standard economic analysis and empirical evidence. Price support, production quotas, set-aside restrictions, direct payments linked to production, and an uneven support across sub-sectors all have more or less obvious impacts on allocational efficiency, on transfer efficiency, and on the overall welfare of society.

Substantial support to the agricultural sector (122 bn € in 2003, which equals 1.3% of the EU's GDP and 84% of gross value added in the sector) not only implies a tax for the rest of the economy, but also leads to significant allocational inefficiencies within the agricultural sector itself. Furthermore, farmers' net benefit from consumers and taxpayers transfers is limited. The transfers of the main policy instruments – price support and area payments – reach farmers only to a low extent (about 25% and 50%). Price support (about 62 bn € in 2003) which still represents more than 50% of total support leads to shifts in production mix and intensities, changes the consumption behaviour and thus implies higher welfare losses than other forms of support. In addition, it runs counter to cohesion objectives as it implies 'hidden' cross-border transfers from consumers in the Mediterranean cohesion countries to producers in other Member States (0.8 to 1.5 bn € a year).

Politically enforced restrictions in production such as set aside and production quotas for certain products add further efficiency losses within the sector. The elimination of set aside restrictions could lead to welfare gains of about 1.2 bn €, while the allocational inefficiencies of the quota system could be highly reduced by the introduction of quota tradability.

Within this overall context, labour productivity developments in the agricultural sector within the EU suggests that most Member States with a relatively low labour productivity are catching up towards the EU average while most Member States with a relatively high labour productivity tend to lag behind average productivity growth. Thus, evidence supports the 'catch-up' hypothesis. The main cause of increased labour productivity in agriculture is the outflow of labour, while relatively high capital input in some Member States has not always led to higher productivity growth. As the increase in farm size has been and will be a major contributor for efficiency gains, further structural adjustment is thus not only inevitable, but should be encouraged.

The main causes of inefficiencies in agricultural support, namely the still high share of price support, the coupling of direct payments to production, and set aside and quota restrictions are being progressively tackled. The 1992 and AGENDA 2000 CAP reforms have implemented stepwise reductions in price support for some products in exchange for

higher direct payments. These positive steps have been pursued by the 2003 reform with significant price support cuts in the dairy sector and are expected to continue with further decisions for e.g. the sugar sector. With respect to the coupling of direct payments to production, the 2003 reform has introduced a fundamental shift towards decoupling. Studies suggest that full decoupling could lead to welfare gains of about 10 bn €. At this stage, a coupling to land remains such that some capitalisation in land prices will continue and Member States may decide to decouple only part of the current direct payments and keep part of them coupled to production. Restrictions in production have so far been left untouched. Quotas per se can only be abolished if price support has been significantly reduced beforehand. Set aside restriction, on the other hand could be abolished more easily.

Further reductions in price support, the abolition of set aside, and the final shifts towards full decoupling are even more necessary with respect to Eastern enlargement. Consumers in the new Member States have relatively low income levels. The utilisation of all available production factors (abolition of set aside) is essential as the agricultural sector still plays an important role. The full decoupling of direct payments would not only lead to higher efficiency in production, but would also reduce the administrative burden for the newly created local CAP administrations.

### **Outline**

**Chapter 2** points out that uneven inter- and intrasectoral support levels leads to allocational inefficiencies. The agricultural sector in the EU benefits from a support level which nearly reaches the net value added produced in the sector. The support level keeps factors of production in the sector which would likely have higher returns in others. Also within the sector the support is uneven leading to allocational inefficiencies. Linked to the efficiency impacts the developments of sectoral labour productivity are described comparing OECD and EU Member States. **Chapter 3** highlights the welfare losses stemming from price support. Price support remains the main source of farm support in the EU, while being one of the least efficient measures. The largely ignored cross border transfers from price support are calculated and point out that cohesion countries would benefit from reducing price support. As lowering price support could lead to increases in volatility of agricultural prices within the EU, the functioning and usefulness of market instruments, namely hedging price risks on the commodity futures markets is explained and illustrated. In this context the relatively low share of farm income in total farm household income is outlined. The chapter concludes that no further income stabilising measures which would demand EU support are necessary. **Chapter 4** analyses the drawbacks of the restrictions in production which have been introduced as a means of supply control. Set aside obligations and production quotas both imply high economic losses. Set-aside obligations imply a welfare loss of about 1.2 bn €. The joint effect of quota restrictions in several sectors should imply a loss of nearly twice this magnitude. Quota tradability would reduce relatively quickly the allocative inefficiencies of the quota systems. Chapter 5, finally, deals with direct payments, which become the most important means of agricultural support. It outlines the benefits of decoupling direct payments from production and points out that the single farm payments introduced in the 2003 CAP reform are still coupled to land with a continued capitalisation of the transfers into the price of land. It also outlines that the administrative costs of agricultural policies are quite high with perhaps 4-7% of agricultural net value added and are unlikely to decrease with the implementation of the 2003 reform, unless the sector undergoes strong structural adjustment.

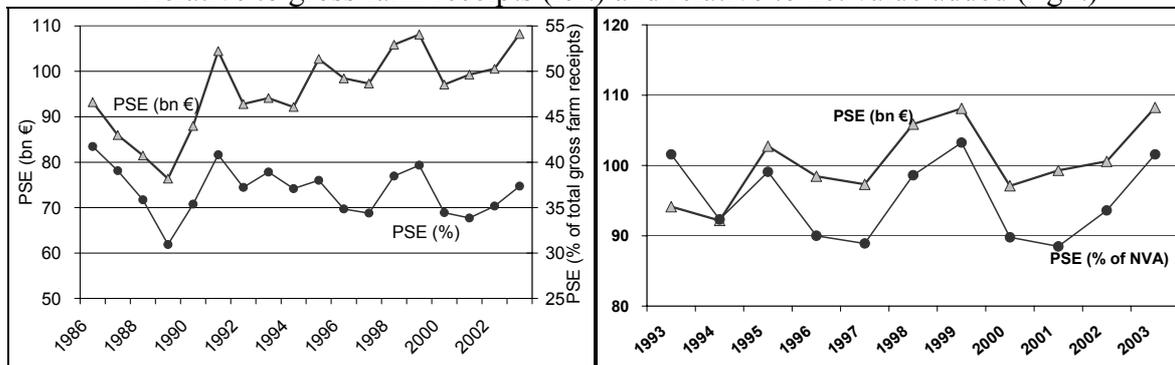
## 2. The Impact of Support on Allocational Efficiency

This chapter draws attention to the impacts of CAP support policies on allocational efficiency. Firstly, from an economy wide perspective, the high support of the agricultural sector can be seen as an implicit tax on the rest of the economy. Scarce factors of production (capital, labour, land) are captured in the agricultural sector, which could derive higher returns in other activities. Secondly, also within the agricultural sector the support is not neutral across agricultural sub-sectors. Thus, even within the sector, allocational efficiency is reduced by varying support levels. Price support, which accounts for more than half of the sectoral support, is by definition coupled to certain commodities, as are (to a lesser extent) direct payments, which form the other major type of support. Finally, impacts on agricultural labour productivity developments are compared across EU and OECD countries.

### 2.1 The Level of Sectoral Support in the EU

The support level of the agricultural sector is relatively high. Since the late 1980ies farmers derive around 37% of their total gross farm receipts from subsidies (Figure 1). The trend goes slightly downwards, but for some products the subsidised part still exceeds 50% in 2003 (see also table A1 in annex). In absolute terms producer support from taxpayers and consumers as measured in Producer Support Estimates (PSE) reaches annually around 100 billion € (Figure 1) and it excludes the, in some cases large national support of farmers' social security systems (e.g. 3.8 bn€ for pension, health, and accident insurance in DE). The support level must be seen in comparison with the sectoral net value added which reached on average nearly 109 billion € in 2001 – 03 (Eurostat), i.e. hardly more than the support to farmers.

**Figure 1: Absolute and Relative Producer Support Estimates 1986 – 2003**  
Relative to gross farm receipts (left) and relative to net value added (right)



note: PSE equals the monetary value of transfers from consumers and taxpayers to agricultural producers (see p. 3); %PSE is ratio of the PSE to the value of total gross farm receipts including budgetary support (left) or the PSE relative to the net value added produced by the sector (right).

Source: OECD (2003), own presentation.

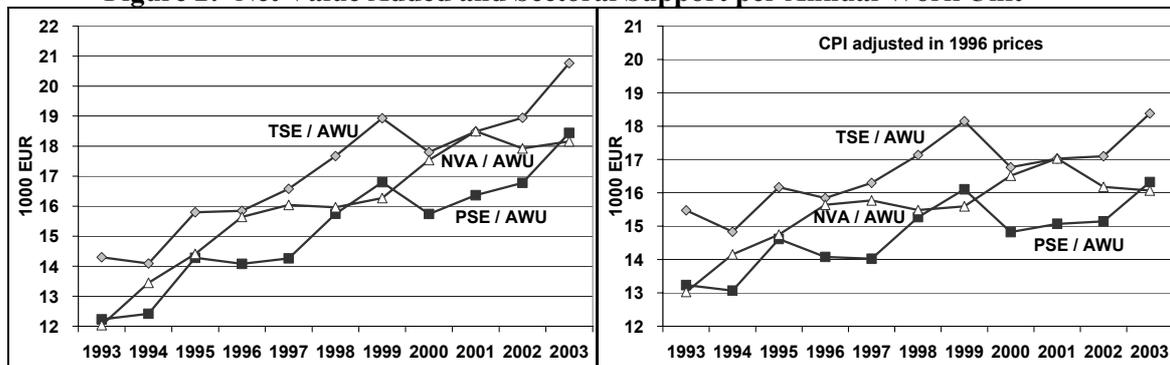
Price support, still the main pillar of agricultural support, has implications for the contribution of the sector to overall economic activity through a price effect and also through a quantity effect. First, statistically, the sectoral output and the contribution to the national GDP are overstated due to the upward biased price levels. In using reference price levels for some major commodities (meat, milk, eggs, the main cereals and oilseeds, potatoes, and sugar) to partly correct for the price effect e.g. for the years 2001 – 03, one would have to correct downward the annual total value of agricultural goods output in the EU-15 (267 bn€) by around 15%, the sectoral gross value added (146 bn€) by around 28%

and the net value added by around 37%. Second, the high protection gives incentives for a higher intensity of production and a higher resource use (capital, labour) in the sector and likely a higher overall production in quantity terms. This has to be kept in mind when comparing agricultural output or productivity with non-EU countries, in assessing the economic importance of the agricultural sector within the EU and in analysing output and productivity growth of the sector.

World market prices for agricultural products followed a downward trend since the introduction of the CAP reflecting the effect of world wide technical progress in the sector and falling transport costs. Internal EU prices, however, increased gradually until the mid 1980s leading to increasing nominal protection rates of the sector. The MacSharry reform (1992) prevented the nominal agricultural support from rising further. However, with a downward trend of support for most other sectors in the EU the effective rate of protection of EU agriculture probably continued to rise slightly even in the 1990s<sup>2</sup>. Figure 1 illustrates the development of producer support estimates since 1986. The relative figures show that in the 1990ies farmers received between 34% and 41% of their total gross farm receipts from direct and indirect support and less than 2/3 through the market (using world market prices as shadow prices). The support varies between 90% and 100% of net value added produced in the sector.

The Total Support Estimate (TSE) reached 122 bn € in 2003 as calculated by the OECD (2004). The total of these transfers to the agricultural sector accumulated to nearly 1.3% of EU's GDP in 2001 - 2003 and accounted for 114% (84%) of net (gross) value added produced in the agricultural sector in 2003. It is the sectoral GVA (NVA) which measures the contribution of the sector to overall GDP (NDP). The sectoral support (TSE) exceeded 20 700 € per work unit (full-time equivalent) employed in the sector in 2003. The development of net value added and total sectoral support per annual work unit is shown in Figure 2. In absolute and in real terms the sectoral net value added and the sectoral support per full time labour equivalent (AWU) is increasing over time.

**Figure 2: Net Value Added and Sectoral Support per Annual Work Unit**



Note: TSE (total support estimate) adds to the PSE the sectoral support without direct income effect for the farmers.

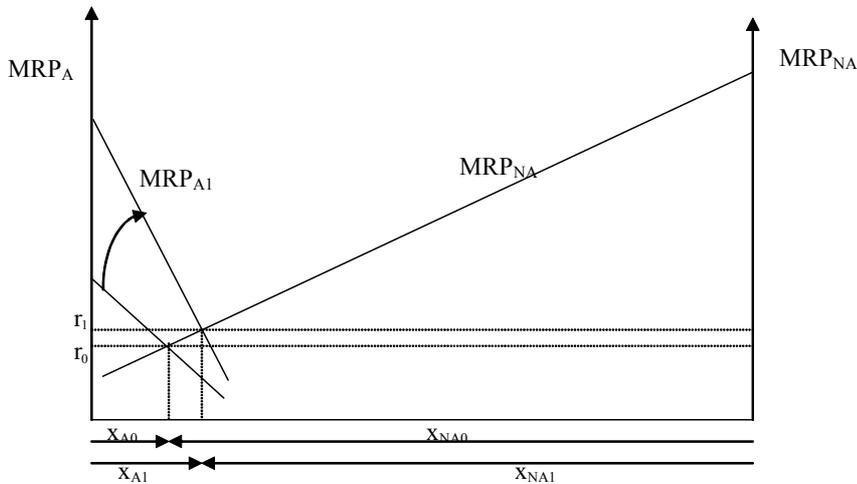
Source: data from EUROSTAT (2004) and OECD (2004); own calculations.

From an economy wide perspective the support of one specific sector implies a taxation of other sectors receiving less support. This can be illustrated with Figure 3 utilising the concept of marginal revenue product (MRP) for the input demand of the agricultural sector

<sup>2</sup> The effective protection rate is 'the percentage increase in value added per unit in an economic activity which is made possible by the tariff structure relative to the situation in the absence of tariffs but with the same exchange rate' (CORDEN, 1966, p. 6, or CORDEN 1997, p. 215). Thus, keeping agricultural tariffs constant while lowering tariffs on direct or indirect inputs for agricultural production makes the effective rate of protection for agricultural production go up.

(A) and the rest of the economy (NA). MRP is the marginal productivity ( $\partial q / \partial x$ ) of a production factor (x) times the price (P) of the output (Q), i.e.  $P * (\partial q / \partial x)$ . In competitive factor markets the price (r) of a production factor is equal to its MRP. The agricultural support increases the MRP of the factors of production (x) employed in the sector. This is indicated by the arrow following the upward shift of the  $MRP_A$ -curve. Factors shift from the rest of the economy towards the agricultural sector and ceteris paribus factor prices ( $r_0$ ) tend to increase. This holds in particular for land for which total supply is fixed, but to a lesser extent also for other inputs. I.e. the agricultural support leads to scarce factors of production being locked in this sector which would likely have higher returns in others. The disproportionate support of this sector is thus likely making Europe poorer from an economic point of view.

**Figure 3: Increase of marginal revenue product for inputs used in agriculture due to sectoral support**



Note: MRP is the marginal revenue product curve, X is a production factor, r is the price of the production factor X, A is the agricultural sector, NA the non-agricultural sector.

In comparing fixed capital consumption as a share of gross value added in the agricultural sector with the respective share of the economy as a whole (fixed capital consumption over GDP) the figure is far higher in the agricultural sector with 25.2% against 13.8% for the EU-15 economy as a whole (2001/02 average). For comparison, in the US the difference is less strong: in agriculture the share is slightly below 20%, while for the economy as a whole it is 12.4% (2001/02 average)<sup>3</sup>. In other words the European farmers have a 25% higher fixed capital consumption per gross value added produced than farmers from the US. The likely biased allocation of production factors in the EU makes it necessary to continuously check the rationale and the effects of all agricultural policy instruments in place to assure that (a) this sectoral bias of support is well founded and justified with non-economic objectives and (b) that these non-economic objectives could not be achieved with less negative consequences for the rest of the economy.

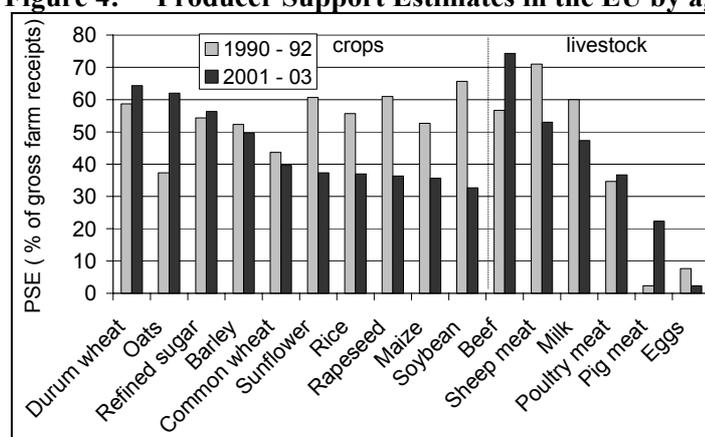
## 2.2 Uneven Support across Agricultural Sub-sectors

The overall support levels taking account of taxpayers' and consumers' transfers to agricultural producers for different crops and livestock products are illustrated in Figure 4

<sup>3</sup> These given shares also represent by which degree net value added of a sector is below its gross value added and respectively the degree by which net domestic product of the economy is below its GDP. Due to its higher capital use in production the importance of the agricultural sector in the overall economy is higher if measured in gross value added of the sector over EU-15 GDP (1.57% in 2002) than in its net value added over NDP (1.37% in 2002).

for the 1990ies. The differences of support across products are significant. Different intensities of support likely result in shifts of production (see also page 48). Less profitable crops are favoured against more profitable crops only because of higher support. This might be justified if the different levels of support were a tool to correct for varying positive or negative externalities of production for the society as a whole. This is, however, not the case. The rationale outlined under Figure 3 holds within the agricultural sector as well. Farmers tend to grow more highly supported crops whose MRP curves moved upwards and fewer crops which receive lower support independent of potentially higher value added produced in the latter group. This has led to a distorted production mix. The move from price support to coupled direct payments has likely led to a reduced intensity of production, but has had little effect on the production mix. From the decoupling of direct payments (2003 reform), however, allocational efficiency is expected to increase with shifts in productions (see e.g. OECD (2004), and external studies for the European Commission preparing the 2003 reform by FAPRI, the University of Bonn, the University of Amsterdam and the Netherlands Bureau for Economic Policy Analysis). Consequently, due to support being coupled to production the allocational efficiency of agricultural production goes down, i.e. by using the same amount of resources an alternative production mix could be achieved which produces a higher economic value. The overview shows that among the sectors analysed the beef, sheep, and milk sectors and the oats, durum wheat and sugar sectors received the highest support which stimulated the excessive production in these sectors. This has also been the case for some sectors not being analysed, especially tobacco, but also cotton and rye producers receive a high absolute and relative support.

**Figure 4: Producer Support Estimates in the EU by agricultural sector**



Products are ranked according to their average levels from 2000 – 2003.

Source: data from OECD – OLISNET (2004); own calculations.

Figure 4 also shows that relative support levels have not been stable over time. Within one decade the relative support has significantly increased for some products (e.g. oats, beef, pig meat) while it has significantly decreased for others (e.g. rape seed, soybeans, sheep meat). If this had led to a systematic convergence of support levels, it could have been considered as an improvement in terms of allocation of production factors. This was, however, not the case. Relative support levels are not only uneven across commodities, but also unstable over time.

The coupling of support to certain products is the main cause of uneven support across agricultural products. This holds especially for price support which is the main component

of PSE (62bn € in 2003, see annex 1<sup>4</sup>) but also for direct payments as long as they are coupled to the production of certain commodities. Direct payments have been introduced with the 1992 CAP reform as a compensatory payment following a reduction in price support. Due to this continued policy change the breakdown of transfers between consumers and taxpayers shows that since the early 1990ies transfers from consumers have been reduced by about 23% and have been taken over by taxpayers. Thus, the origin of transfers has changed, but they have remained fully coupled to the production of certain commodities within this period. Agricultural policy measures are seen as decoupled if they have no or only very small effects on production and trade. In economic terms policy measures can be considered decoupled if they do not affect relative prices of agricultural commodities or of the inputs used to produce them. A more decoupled support would improve allocative efficiencies within the agricultural sector and would be more in line with one of the main agricultural policy objectives '*increasing the efficiency of the agricultural sector*', a necessary condition for sustaining income levels from agricultural activities. In this respect the 2003 reform was a very positive step in introducing the 'decoupling' of direct aids (see chapter 5). While Member States currently still opt for a partial coupling of these direct payments, the degree of coupling will decrease further over time and allocational efficiency in the sector will increase. Also the reforms of the olive oil, cotton, tobacco and hop sectors in 2004 have included a partial decoupling of support.

## **2.3 Labour Productivity and Sectoral Restructuring**

Labour productivity is one indicator of efficiency. In the agricultural sector of the EU the impact of policy measures on the outcome of efficiency calculations is rather large. As pointed out above, the CAP price support has implications for the contribution of the sector to overall economic activity through a price effect and also through a quantity effect – both leading to output levels above those of a situation without policy interventions. As market prices are used in statistics and not economic shadow prices (e.g. border prices) the output is evidently biased. This biased level of agricultural output, thus, needs to be kept in mind in the productivity analysis below.

When comparing productivity levels and developments in the agricultural sector between selected OECD countries and the EU, as well as developments across EU countries, four results are worth being pointed out. First, most Member States with a relatively low labour productivity in agriculture are catching up towards the EU average while most Member States with a relatively high labour productivity tend to lag behind average productivity growth. Thus, evidence supports the 'catch-up' hypothesis, for which BALL ET AL. (2001) have also found evidence. Secondly, the main cause of increases in agricultural labour productivity in the EU is the outflow of labour. Thirdly, the analysis shows that relatively high capital input in some Member States has not always led to higher productivity growth. Finally, the breakdown of productivity across farm size suggests that the increase in farm size has been and will be a major contributor for efficiency gains. Further structural adjustment is thus not only inevitable, but should even be supported.

### **2.3.1 Labour Productivity**

#### ***Labour productivity in the EU and other OECD countries***

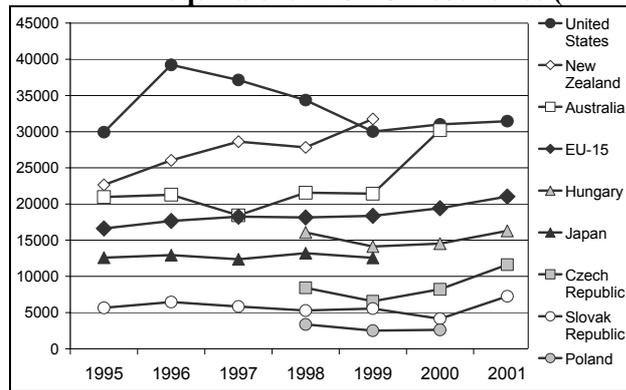
For a comparison of EU labour productivity with other OECD countries, OECD data is used for labour inputs in full-time equivalents and for net value added (current PPP US\$).

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<sup>4</sup> Annex 1 shows yearly details of PSE for the crops analysed by the OECD both in % and in aggregate absolute figures. The exchange rate to the US\$ is added for information as with a depreciation of the € ceteris paribus market price support levels go down and vice versa.

Countries with relatively low agricultural support such as Australia and New Zealand (the OECD countries with the lowest support) seem to have faced a rather positive development. One might also conclude that the performance in the EU has improved relative to the US where support reaches about 2/3 of the EU support. This has happened, although the level of EU price support decreased to some extent, thus reducing the upward biased effect in value of output. The main cause is that labour input in the EU has decreased by 16% within the period (compared to e.g. minus 1% in the US, minus 2% in New Zealand and plus 1% in Australia). This has more than offset the increase in fixed capital consumption in the EU of 12% (7% in the US, 28% in Australia). Furthermore, total output has fallen significantly in 1998 and 1999 in the US.

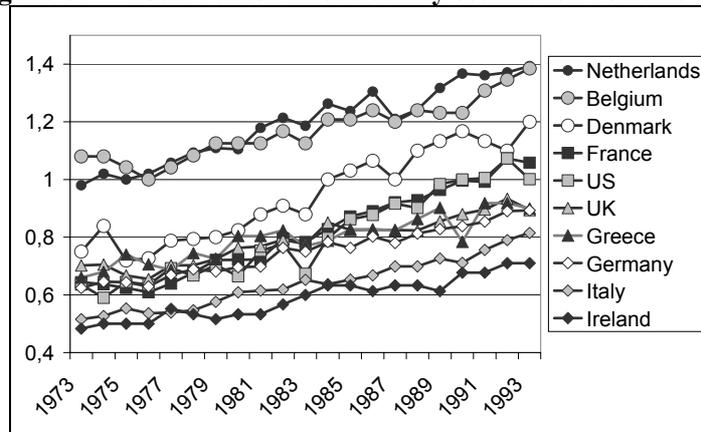
**Figure 5: Agricultural net value added per full time labour equivalent in OECD countries (in PPP \$)**



Note: The above mentioned statistical effect of price support is particularly high in Japan and the EU – the former with higher protection levels than the EU. Thus, the performance level in agriculture has been lower than indicated here. Source: data from OECD (2004); own calculations.

BALL (2001) has estimated total factor productivity developments of EU countries' agriculture as compared to the US from 1973 to 1993 (Figure 6). Total factor productivity is a measure that accounts for the change in output that is not explained by changes in the level of inputs used in production. According to his analysis French and US farmers have worked at similar productivity levels, while Dutch, Danish and Belgian farmers have produced at higher efficiency levels. Italian and Irish agricultural production was estimated to be the least efficient among the ten countries analysed.

**Figure 6: Total Factor Productivity estimation relative to 1990 US level**



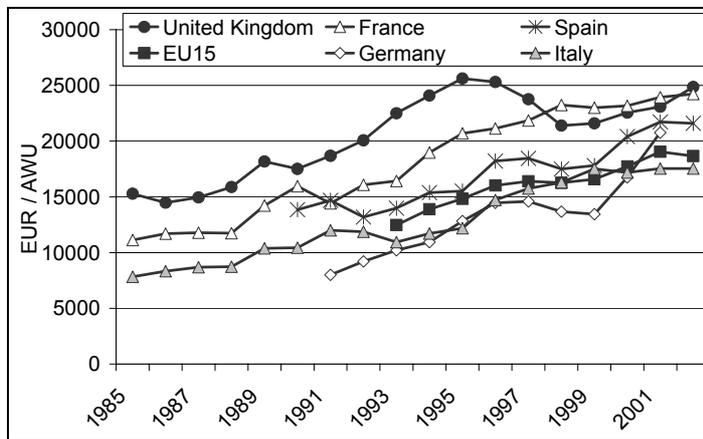
Source: BALL (2001).

**Labour productivity developments within the EU**

In the EU-15 labour productivity in the agricultural sector (measured by nominal net value added per full-time employment equivalent) increased by about 4.3% annually since 1993.

The larger countries more or less followed this trend with a stronger growth in Germany and a slower growth in the UK (see Figure 7). The main cause of the increase is a continuous reduction of agricultural employment. Nominal net value added increased by only 1.2% annually from 1993-95 (avg.) to 2000-02 (avg.).

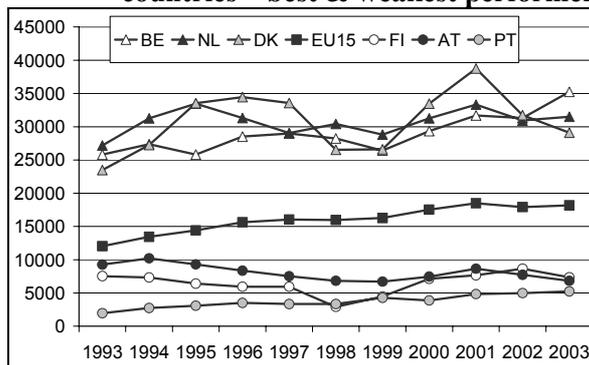
**Figure 7: Net value added (current €) per annual work unit in larger EU countries**



Source: data from EUROSTAT (2003), own calculations.

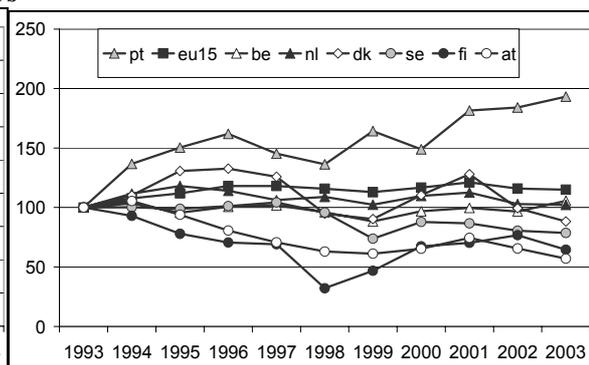
In smaller Member States the situation diverges from the aggregate levels (Figure 8). While Denmark, Belgium, and The Netherlands maintained the highest levels of labour productivity, Portugal, Finland, and Austria remained at the lower end within the EU-15. While in Portugal productivity grew faster than EU average since 1993, Finland and Austria were faced with a fall in agricultural labour productivity. For the latter two countries the productivity fall can at least partly be explained by a statistical effect due to policy changes. With their accession to the EU, they had to adjust downward their price levels for some major agricultural products. This price reduction lowers their output (measured in market prices) and also their value added (Figure 9). The price adjustment had already started prior to accession.

**Figure 8: Net value added (current €) per annual work unit in smaller EU countries – best & weakest performers**



Source: Eurostat data (2004), own calculations.

**Figure 9: Net value added in selected smaller countries (1993=100)**

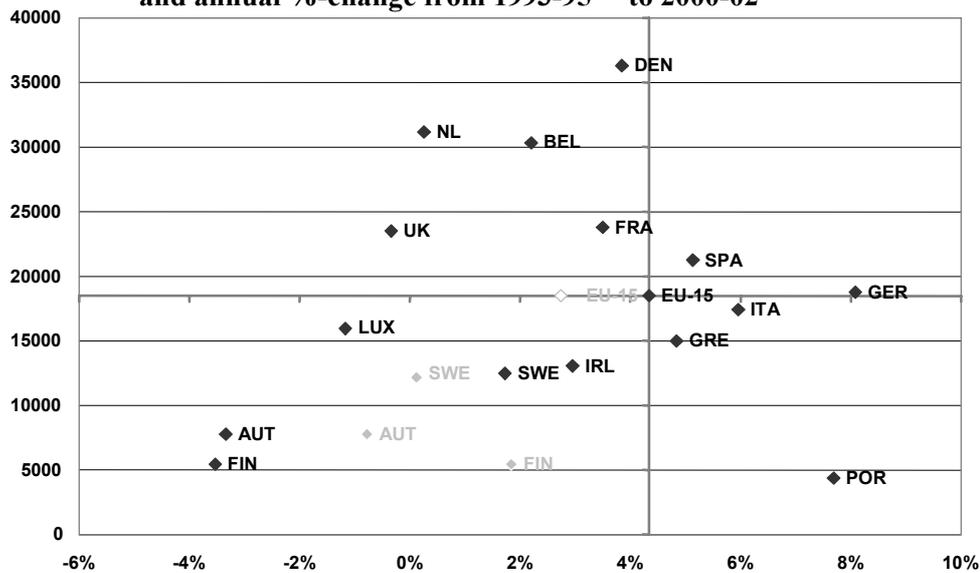


Source: Eurostat data (2004), own calculations.

Figure 10 summarises the situation for all Member States.

The upper left quadrant includes those countries which have productivity levels above EU-15 levels, while having realised a slower growth of labour productivity since 1993. Due to stronger productivity growth in this period Danish farmers took the lead from the Dutch farmers who have experienced the lowest outflow in labour force within the EU.

**Figure 10: Net value added per annual work unit in 2000/02\* (€) and annual %-change from 1993-95\*\* to 2000-02\***



\*Due to missing 2002 data, for BEL, GER, FIN, and SWE the 2000/01 average has been used.

\*\*To take out the accession effect for AUT, FIN, SWE the annual % change as from 96/97 is also presented (grey).

Source: data from EUROSTAT (2003); own calculations.

In the lower right quadrant are those countries which range below EU productivity levels, but have been catching up due to stronger growth rates. Germany has, therefore reached EU-15 levels in absolute terms (profiting from the 4<sup>th</sup> highest labour outflow behind Ireland, Finland, and Portugal, while reducing the initially highest fixed capital consumption per gross value added). Spanish producers in the upper right quadrant realised relatively high growth and levels in labour productivity, despite having only the second lowest labour outflow. However, Spanish producers have also kept fixed capital consumption as a share of gross value added at the 2<sup>nd</sup> lowest level (behind Greece).

In the lower left quadrant are those countries whose productivity levels have fallen further behind due to slower (or even negative) productivity growth. In all those five countries the absolute level of agricultural net-value added has fallen (as happened to a lesser extent in the UK and Belgium while only marginal growth was experienced in the Netherlands). Producers in these countries (except Ireland) have the highest fixed capital consumption per gross value added within the EU (around 50%). This indicates that a high capital use does not necessarily lead to higher productivity growth. Also Ireland has increased its capital intensity by 9 percentage points (to 24% of GVA) to nearly reach EU levels (26%).

Austria, Finland, and Sweden joined the EU in 1995. With accession especially Austria and Finland had to reduce for major commodities the national market price support down to EU-levels. As output is measured in market prices the output and, thus, the net value added has dropped in these countries. To correct for the market price falls towards 1995/96 the annual growth as from 1996 – 97 is also presented for these Member States and the corresponding EU-15 growth rate (grey letters). After accession the average annual growth rate was higher in Austria and Finland, but stayed (as in Sweden) below EU-15 average growth. The latter could be explained by relatively intensive post accession direct payments in these countries to dampen the income effect of price support reductions. These payments, however, reduce the structural adjustment efforts in the sector. One could, thus perhaps expect a time lag of stronger adjustments leading to catching up. Since 1999 above EU average productivity growth can be observed in all three countries and they are probably in the process of shifting to the lower right quadrant.

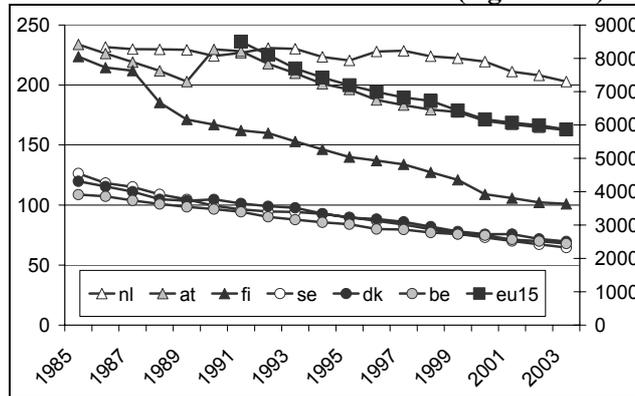
Thus, one can observe that nearly all countries fall in the upper left or in the lower right quadrant. Countries with lower productivity are tending to catch up, while highly productive Member States are faced with lower productivity growth.

Future price reforms of the CAP will further change the picture. Currently, the NVA of the sector is still overstated because of significant price support in the meat, milk and sugar sectors. The ‘true’ NVA (using shadow prices instead of supported market prices) is currently lower in all Member States, but especially in Denmark, The Netherlands, Belgium, and most of all in Ireland.

**Labour outflow in the agricultural sector**

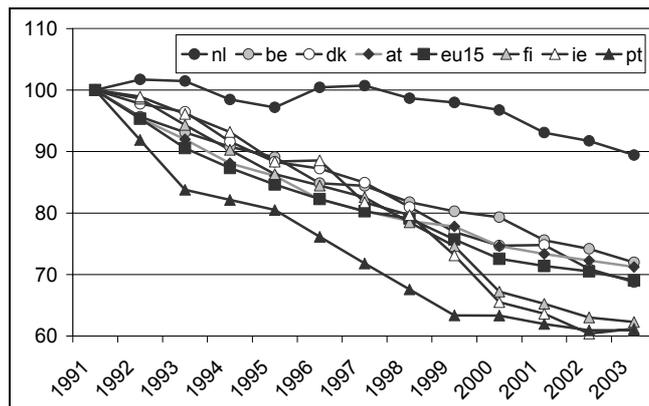
The productivity increase in the EU has mainly been the result of a reduction of labour input in the sector. For the EU as a whole (right hand scale of Figure 11) the total sectoral labour input went down by 22% from 1993 to 2001. The highest reductions in this period have been in Ireland (34%), Finland (31%), Portugal (26%), Germany (26%), and in Sweden (26%), while in the Netherlands the reduction has been merely 8% (see Figures 11 and 12).

**Figure 11: Agricultural annual work units ('000) in selected Member States and EU-15 (right scale)**



Source: data from EUROSTAT (2004); own calculations.

**Figure 12: Agricultural annual work units in selected countries (1991=100)**

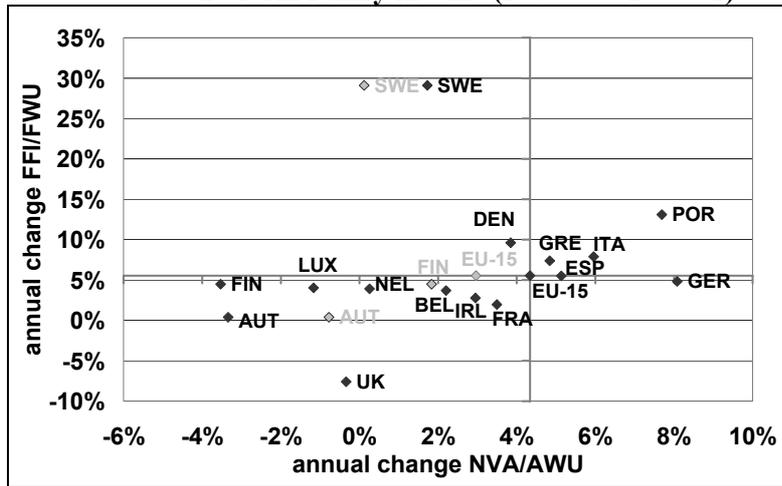


Source: data from EUROSTAT (2004); own calculations.

The labour outflow can be decomposed to a reduction in the number of farms and from a reduction of labour input per farm. The latter holds although the average farm size has increased. For EU-12 the number of farms went down from nearly 8 million in 1990 to slightly above 6.4 million in 2000 (EUROSTAT). More than half of these farms still utilise an agricultural area of less than 5 ha. Simultaneously, the amount of annual work units per farm went down from 1.00 to 0.93. Nearly 75% of the labour input in EU-agriculture stems from the farm holder’s family.

As the productivity increase has mainly been the result of an outflow of labour, one can assume that the increase in labour productivity in the sector positively correlates with family farm income. Figure 13 supports this hypothesis, as it indicates that Family Farm Income (FFI) per Family Work Unit (FWU) increases with labour productivity (on average even more than proportionally). Sweden, Finland and Austria have to be looked at separately due to their accession adjustments. For these countries annual changes as from 1996/97 are also given (in grey).

**Figure 13: Annual changes in labour productivity (NVA/AWU) and farm family income (1993/95 – 2000/01)**

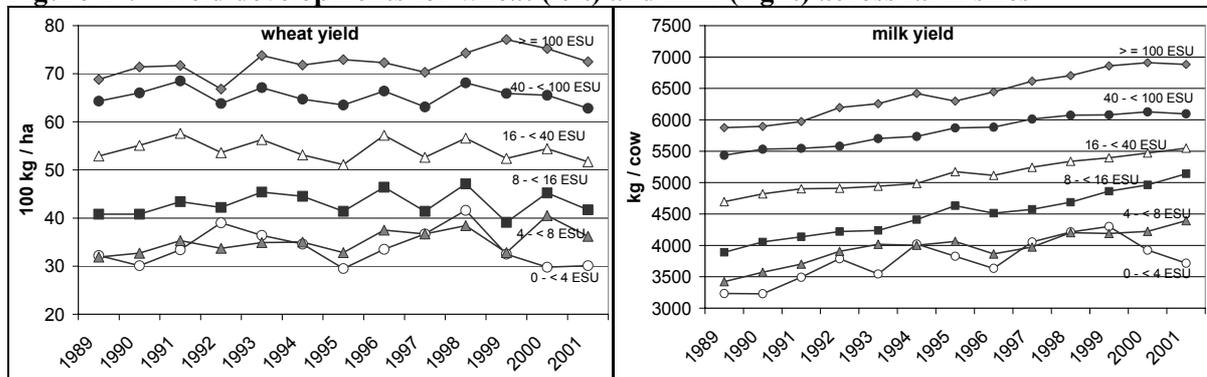


Source: data from EUROSTAT (2003); own calculations.

### 2.3.2 Productivity developments in different farm size categories

The productivity developments at aggregate levels as presented above can be broken down into e.g. different farm size categories. Theoretical considerations lead to the hypothesis that relatively large scale economies could be realised in agricultural production. Rapid technical progress in the sector has led to technologies which substitute labour by capital. An efficient use of many of these technologies, however, requires larger production units. Investments and productivity could, thus be higher in larger farming units. In terms of productivity many smaller farms are further handicapped by the time and management constraints of many of their holders, who farm only part-time as their secondary occupation. Holders of larger farms who are fully dependent on farming income as their main source of household income devote more time and efforts to optimising their production. This is reflected in significant yield differences across farms sizes. Figure 14 shows these relatively large differences for wheat and milk production.

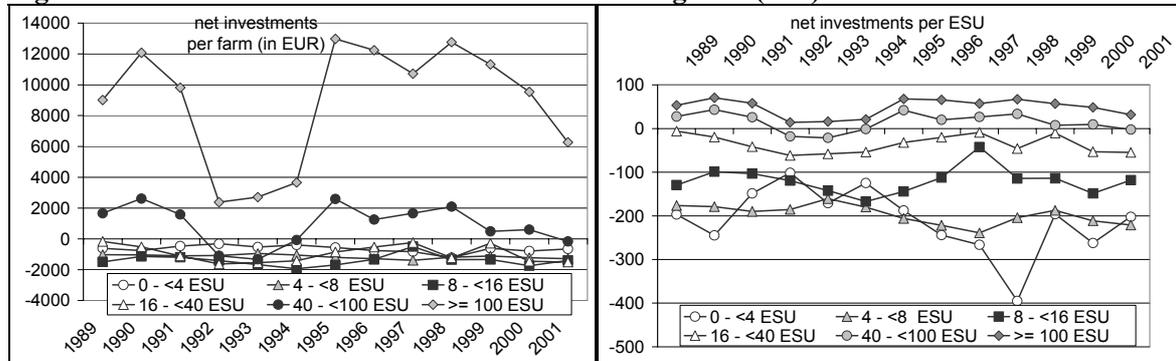
**Figure 14: Yield developments for wheat (left) and milk (right) across farm sizes**



Note: farm sizes are measured in economic size units; one unit ESU represents 1200€ of standard gross margin.  
Source: FADN (2004).

Another and perhaps more important explanatory factor is the likely higher technological level on larger farms. This is illustrated in Figure 15. Net investments (gross investments minus depreciation) are only positive on average in larger farm categories. For a better comparison of the levels the right figure gives net investments per economic size unit (1200€ standard gross margin). Smaller farms on average disinvest, which is plausible as a high share of those are not likely to be taken over by the next generation.

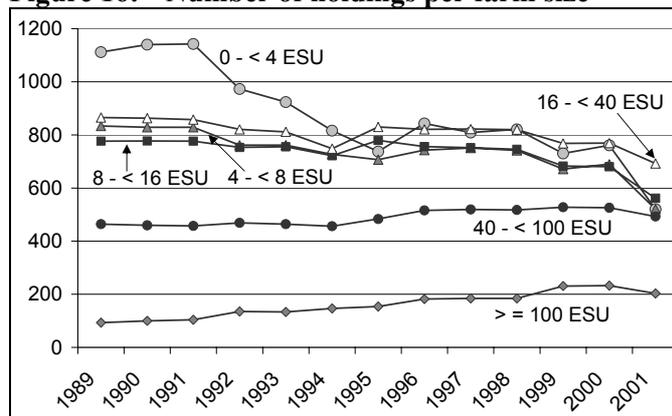
**Figure 15: Net investments in different farm size categories (in €)**



Note: farm size is measured in economic size units; one unit ESU represents 1200€ of standard gross margin  
Source: FADN (2004).

One could deduct from the continuously negative net investments on small farms that further structural change in the sector is on its way (small farms going out of business) and likely to lead to further efficiency gains in the sector. This hypothesis is supported by the fact that in the two largest farm size categories the number of farms has increased during the 1990ies while in the four smallest farm sizes the number of holdings has decreased significantly (see Figure 16). The higher productivity of larger farms (in terms of yields) also matches with the variation of productivity across countries (Figure 9). In Denmark, Belgium, The Netherlands and the UK the share of small farms is relatively low, which indicates that structural differences mainly cause productivity differences across the EU. With a view to increasing productivity of the sector as a whole, policies should try to support these structural changes. All policies which would hamper structural adjustments would run counter to the efficiency objective of CAP policies.

**Figure 16: Number of holdings per farm size**

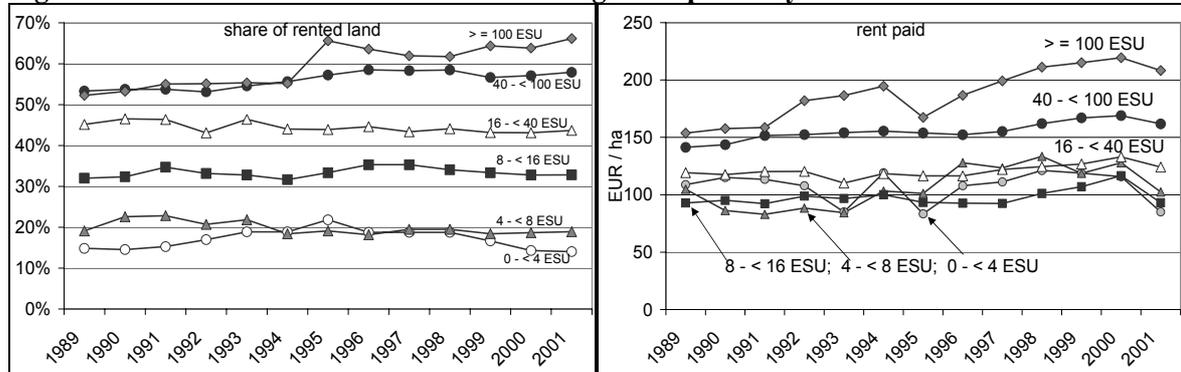


Note: one unit ESU represents 1200€ of standard gross margin  
Source: FADN (2004).

The expansion of farms is possible either via the increase in stocking rates (livestock units per hectare), via the shift towards higher value production or via the increase in agricultural land under cultivation. For the latter the renting of additional land is more attractive (under liquidity constraints) and/or easier (in limited local markets) than the

purchase of land. Thus, larger farms tend to have a larger share of rented land (Figure 17). Larger full-time farmers are on the one hand dependent on renting additional farm land to better exploit scale economies, but on the other hand their higher efficiency also allows them to pay a higher rent. The relatively large difference in average rent paid per category is also reflected in Figure 17.

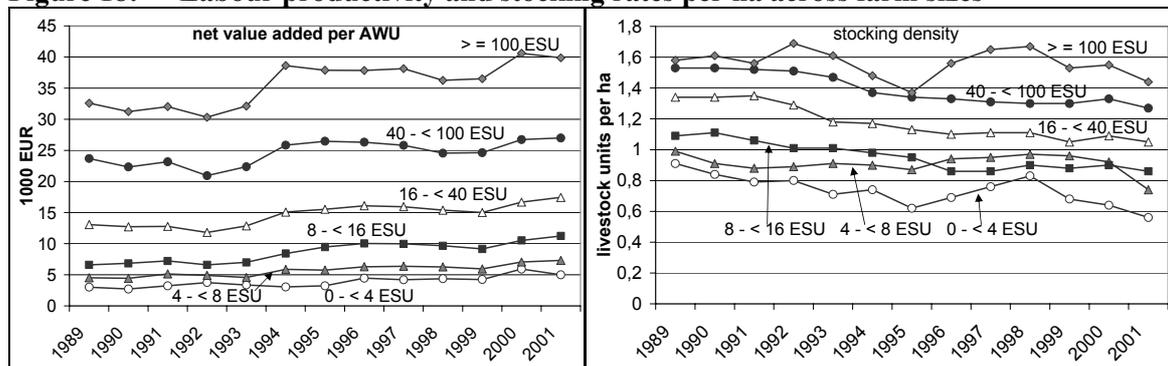
**Figure 17: Share of rented land and average rent prices by farm size**



Note: farm size is measured in economic size units; one unit ESU represents 1200€ of standard gross margin. Source: FADN (2004), own calculations.

Possibly due to the scale economies realisable with modern technologies, the differences in labour productivity are even more significant than the variations in yields. Figure 18 shows that the net value added per Annual Work Unit of larger farms is several times larger than those of smaller farms. As net value added is used, the higher capital intensity of larger farms is taken into account. The higher output of larger farms (in value terms) is also positively influenced by the higher stocking density on their farms. Part-time farmers of small holdings have a time constraint leading to fewer animals on their farms on average and also to a less optimal timing of e.g. plant protection measures leading to lower yields and/or higher input costs.

**Figure 18: Labour productivity and stocking rates per ha across farm sizes**



Note: farm size is measured in economic size units; one unit ESU represents 1200€ of standard gross margin. Source: FADN (2004).

### 2.3.3 Farm Family Income from Farming

From a farm holder's point of view an important variable is the income per full-time family labour engaged on the farm. For the sector as a whole, family labour income increased from 9045 € in 1991-93 to 14713 € in 1999-2001, an annual increase of 6.27% (table 1a). In the economy as a whole the nominal compensation per employee increased by only 3.18% annually. The absolute income level from farming per family working unit is, on the other hand, less than half the income in the economy as a whole. Therefore, the incentives to search for income alternatives and/or give up the farming business remain for most farm holders. The majority of farms today are operated on a part-time basis with the

main source of family income stemming from outside the agricultural sector. About 83% of family labour on EU-15 farms works only part-time on the farm (Eurostat 2004). Table 1b gives for an illustration a breakdown of farm income levels per family working unit according to economic size. The figures suggest that structural adjustments towards larger farm size units (as Figure 16 has shown for the past) will likely continue.

All in all one can derive that with respect to the income objective of CAP policies as well as of the efficiency objective, it seems most suitable to further increase the share of holdings with a higher standard gross margin. Support measures do not necessarily have to target the agricultural sector itself. Increasing the alternative income possibilities outside the sector could be an objective, as well as support for training and mobility. Such support could pull labour out of the sector as it would increase the opportunity cost of the labour employed in agriculture. Such measures would benefit those leaving the sector and those remaining who are able to expand.

**Table 1a: Comparison of farm family labour income with overall economy (in €)**

	1991-93 av.	1999-01 av.	Annual increase (%)
<b>Income per Family Work Unit in Agriculture</b>	9045	14713	6.27
<b>Nominal Compensation per Employee in Overall Economy (EU-15)</b>	24477	31437	3.18

Note that figures for 'compensation per employee' are before paying income taxes. With their relatively higher tax burden the position against the agricultural sector worsens after tax payments.

Sources: data from FADN database and AMECO database, own calculations.

**Table 1b: Labour income from farming in different farm categories (1999-2001 av.)**

<b>Standard Gross Margin (1000 €)</b>	<b>0 – 4.8</b>	<b>4.8 - &lt; 9.6</b>	<b>9.6 - &lt; 19.2</b>	<b>19.2 - &lt; 48.0</b>	<b>48 - &lt; 120</b>	<b>&gt;= 120</b>
<b>Income per FWU (€)</b>	4,868	6,490	9,700	15,422	24,111	46,594

FWU = family work unit; the average standard gross margin has been 22,500 € per farm in 2000.

Source: FADN database

### 3. Price Policies

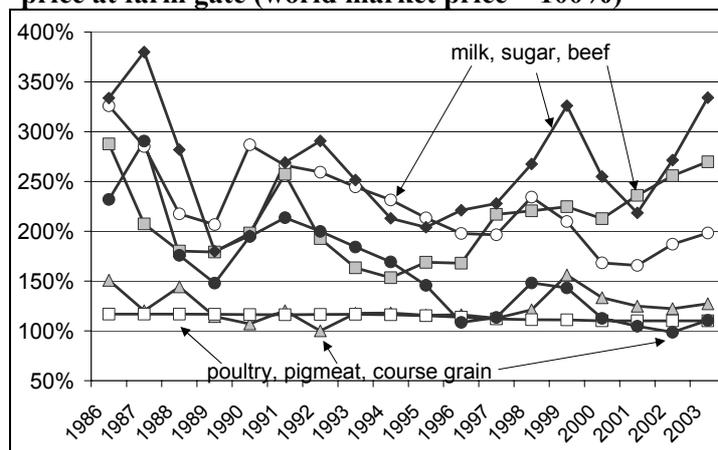
This chapter first gives some background on price policy developments and outlines the main drawbacks of price support policies in terms of economic efficiency and in terms of equity and cohesion objectives. Thereafter, it describes the magnitude of price volatilities in the agricultural sector and shows how they can be dealt with using market instruments – in particular the futures market. A simulation for pig producers is summarised to illustrate the income stabilising effect of this market based risk management instrument. The issue of farm income stability is then examined, taking into account the composition of total farm household income. The last section concludes that the sector as a whole is not in need of additional income stabilising policy measures.

#### 3.1 Background

Price support has been introduced to serve three main objectives: Increasing the income of farmers, stabilising the income of farmers, and increasing production to increase the EU's self-sufficiency and ensure sufficient supply of agricultural products. The measures which have been introduced are import tariffs, export subsidies and public intervention at

administratively fixed priced. The objectives have been reached and in part even more than sufficiently, but in line with economic theory price support turned out to be economically costly and highly inefficient to serve these goals. In the 1980ies the EU shifted from becoming a net-importer to a net-exporter of most agricultural products, which gradually increased the payments for export subsidies and intervention measures. This made the economic costs of price support also building up increasing pressure on the EU budget. Furthermore, in shifting the main burden to consumers, price support contradicts the objective of providing food at reasonable prices. This has been taken into consideration in the 1992 and AGENDA 2000 reforms in initiating a gradual shift of part of the price support to direct payment schemes. Due to the reforms and the depreciation of the € against the US\$ the share of price support measures in overall support was reduced from more than 78% in the late 1980ies to around 57% in 2001 – 03 reaching 58 bn € (OECD, 2004). The implementation of the 2003 reform will bring some further improvements (milk sector), while the appreciation of the € against the US\$ has the reverse effect. Price support, thus, remains an important issue to be discussed. The producer price difference to world market price levels is illustrated in Figure 19. Wheat and course grain – important product groups in value terms – have reached about world market levels.

**Figure 19: EU farm gate prices for selected products relative to world market price at farm gate (world market price = 100%)**



Source: OECD (2004) and own calculation.

## 3.2 The costs of price support

### 3.2.1 Deadweight loss and the burden for the consumers

Price support has three main drawbacks from an economic point of view: (i) Consumers are implicitly taxed by higher price levels and lose welfare, (ii) producers have an incentive to increase the intensity of production above optimal levels and (iii) the production mix is distorted as the relative price support is not uniform over all products. Price support policies do not result in a zero-sum redistribution. They imply welfare losses as the benefits for producers are more than outweighed by losses for consumers and taxpayers. Therefore, administratively changing price levels to favour a certain group of society is less efficient than pure transfers from one group to another. The reasons are that price shifts cause greater changes of behaviour in society as a whole, and that the function of prices to indicate the scarcity of the good or service is undermined.

(i) The direct impact on consumers is straightforward as they have to pay more per unit of product. Furthermore, an increase in prices will usually lead to a reduction in consumption as consumers respond to the price changes. The implicit consumption tax is paid by rich and poor members of society alike with the poor likely to be more responsive to price

changes in food. As the expenditure share for food is higher for the poor, price support policies have distributional effects which contradict the common progressive tax systems. Alternative support systems via the tax system would be socially more sound and acceptable. Finally, a transfer from consumers to producers via the price policy is hardly a transparent form of support. Consumers are usually not aware that agricultural products are implicitly taxed by 30-40% to support the EU agricultural sector (see annex 2).

(ii) The producers on the other side not only receive higher prices on their current production, but they get the incentive to increase production while using up more resources of land, labour, capital, and plant protection measures. The additional production is more costly in terms of resources used per output unit than within a 'no support' scenario and is only profitable with price support. This 'overuse' of resources causes a major part of welfare losses from price support. Without price support these additional resources could be used for production of goods and services with a higher economic value. In other words additional resources (land, labour, capital, fertiliser, pesticides, etc.) are allocated to production, although the economic value (using world market prices) of the production increase is lower than the cost of the increase in input use. Finally, while being in a net-exporting position for most products receiving price support the EU pays export subsidies to make exports possible by filling the gap between internal and external price levels.

(iii) As price support is by definition coupled to specific commodities and as price support levels vary highly across commodities, it gives incentives to diverge from an economically optimal production mix. It therefore contributes to the lowering of allocational efficiency in the sector.

Box 1 illustrates comparative static effects of price support together with some quantification.

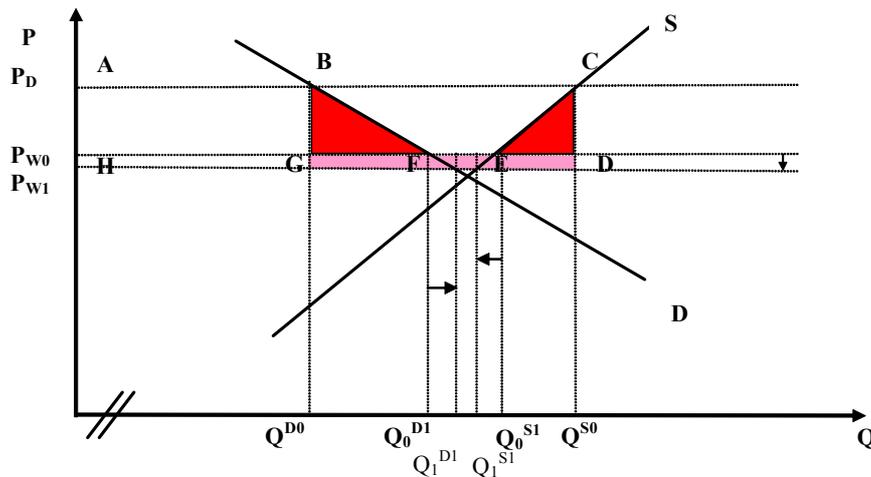
### **Box 1: Welfare Effects due to Price Support**

A stylised Figure B1 summarises the overall comparative static effects for three groups of players: producers, consumers, and taxpayers. At first a small exporting country assumption is made. With the policy induced higher price level  $P_D$  the domestic demand  $Q^{D0}$  is lower compared to the situation without price support ( $Q_0^{D1}$ ). The supply is higher with support ( $Q^{S0}$ ) than without ( $Q_0^{S1}$ ). The increased price level adds producer surplus by the area ACEH. The consumer surplus on the other side is reduced by the area ABFH. Furthermore, the taxpayers' burden to sustain the higher price level (excluding the administrative costs), are depicted by the area BCDG. This transfer is necessary to export ( $Q^{S0}-Q^{D0}$ ) at competitive prices on the world market. In net terms the policy results in a welfare loss equal to the area of the two shaded triangles (BFG+CDE). The simple static analysis underestimates the welfare losses as it does not take the administrative costs into account.

For some products (e.g. cereals 10%, butter 20%, whole milk powder 40%, beef 17%, sugar 17%, tobacco 9%) the EU export share in world trade is significant and increased exports due to price support puts downward pressure on world price levels. This terms-of-trade effect thus increases the welfare loss for the EU as a whole. In Figure B1 arrows indicate the effect of a world-wide price fall to  $P_{W1}$  and the increased deadweight loss is shown by the light shaded rectangle representing an increase in export subsidy payments.

The market price support favouring producers in the EU (area ACDH) amounted to 62 bn € in 2003 (OECD, 2004) while the output value of agricultural goods reached 265 bn € (basic prices; Eurostat, 2004). The refunds paid by the EU budget (area BCDG) reached nearly 5.5bn€ and expenditures for public stockholding – another measure to keep internal market prices up – amounted to about 0.9 bn € in 2002. The total transfers from consumers summed up to 60 bn € in 2003(area ABGH)\*.

**Figure B1: Stylised Illustration of Welfare Effects due to Price Support**



Source: own presentation

\*The sum of the export refunds and the consumer transfers exceeds the price support favouring EU's producers as part of the benefits go to third countries' producers via preferential imports.

The burden per EU inhabitant to support the agricultural sector reaches 320€ per year with 51% as taxpayer and 49% as consumer. In the farm sector each Annual Work Unit receives more than 20,000€. Table A2 summarises the burden for the consumers for different agricultural products.

### 3.2.2 Transfer efficiency

Farmers in the EU-15 receive around 100 bn€ of support annually of which slightly more than 50% is stemming from price support policies. The question arises to what extent farmers benefit from these transfers. Estimates of transfer efficiency of support (asking how much of each € spent for a certain support measure actually benefits the recipient) indicates low efficiency for the main CAP measures. With respect to price support this is evident taking into account the implied deadweight losses described above. One can differentiate efficiency losses (caused by support measures) from distributive leakages where the final beneficiaries are others than the farmers initially receiving support. Both causes of transfer inefficiency are particularly high for market price support measures which still form the main part of sectoral support.

With a comparative static analysis the OECD (2002, p. 25) estimates the transfer efficiency of price support to be around 23% in OECD countries in general (assuming 50% of the farmland is owned by farmers). Approximately 28% of support accounts for opportunity costs of those factors of production diverted to price supported commodities. The remaining 72%, however, do not stay with the initial recipient, but are partially redistributed to non-farmers. Market price support gives a stimulus towards more and also more intensive production. The implied increased input demand makes farmers pay out a significant part (nearly 36%) of their increased receipts to input suppliers. Furthermore, nearly 26% of price support is capitalised in higher land prices while increasing the farmers' cost of production. Thus, assuming a farmer owns half of the land utilised, 77% of the market price support does not reach him.

In EU-15 the ownership share of farmland is about 57% in 2000 (Eurostat 2003) and thus somewhat higher than in the stylised OECD analysis. Accordingly one can derive a transfer efficiency of price support of ~25% for the EU. However, the ownership share is below 50% for the farms utilising more than 50ha. Thus, for this group of mainly

expanding full-time farmers the transfer efficiency is even lower than the EU average. For smaller (and often part-time) farms, the ownership share is higher. However, the increase in wealth of owned land should not be interpreted as additional income, especially as some of the owned land has previously been purchased at increased prices.

The comparison of the relatively low transfer efficiency of price support with e.g. area payments show significantly higher transfer efficiency for the latter. According to the OECD, more than 90% of area payments are capitalised in higher land prices (see also chapter 5). I.e. in the EU more than 40% of the area payments are redistributed to landowners who are not farmers. Leakages to other input suppliers are, however, smaller. Table 2 compares the ‘leakages’ of area payments and price support. The transfer efficiency of area payments (47%) is about twice as high as that of market price support. The newly created Single Farm Payment (2003 reform) is subject to the use of farmland. The effects should thus be similar to those of area payments described here. From a transfer efficiency point of view the main alternatives for price support – area or single farm payments – are clearly to be preferred. The figures given are standardised approximations for OECD countries and roughly hold for the EU as well.

**Table 2: Final beneficiaries of market price support and area payments (in %)\***

	<b>Market Price Support</b>	<b>Area Payment</b>
Farm household labour	10	1
Farm household land	13	46
<b>Farmers’ benefit</b>	<b>23</b>	<b>47</b>
Non-farming landowners	13	45
Input suppliers	36	3
<b>Other beneficiaries</b>	<b>49</b>	<b>48</b>
<b>Resource costs**</b>	<b>28</b>	<b>5</b>

\*assuming 50% of the utilised land is owned by the farmer.

\*\*Resource costs are ‘opportunity costs of resources diverted to production of supported commodities’.

Source: OECD (2002).

The transfer efficiency of market price support could even be worse (like in the sugar sector). If e.g. preferential import arrangements directly shift part of the benefits to third countries or if the price support is not just benefiting farmers, but also the respective processing industry – the latter not being an initial target of agricultural support.

### **3.2.3 Consequential Inefficiencies and Costs in the Agri-Food Sector**

Distorted price ratios affect the downstream sector as well. For instance dairy processing units have an incentive to shift away from products demanded by the consumers and to specialise in the production of less risky intervention commodities (butter, skimmed milk powder). The latter, however, is less risky only in the short run and some dairies which have focused to a high degree on butter and SMP production face difficulties by losing the capacity to innovate. In the light of future reductions in milk price support, those dairy processing firms which did not fall into the trap of less risky production for intervention have a competitive advantage. The other group has not necessarily made wrong business decisions as such, but has made different assumptions on future policy developments. They have, thus, been tempted by CAP policies to be less innovative. Hence, the allocation of resources became less efficient also within a sub-sector.

Furthermore, price support implies the necessity to compensate downstream sectors which are negatively affected by the support measures. This holds e.g. for food processors and for the chemical industry using high priced sugar. In reducing price support the EU would, therefore, realise a further benefit in being able to eliminate the compensatory payments to the sectors affected. In addition, the associated administrative costs could be reduced.

Some of the current transfers to sectors being negatively affected by the price policy are outlined in table 3.

**Table 3: Transfers to sectors negatively affected by price policy (in mn €)**

	Budget line	Outturn 2001	Appropriation 2002	Appropriation 2003
Food processor (potato starch)	B1-1021	225.51	234.00	234.00
Food processor (starch)	B1-1022	63.63	38.00	25.00
Chemical industry (sugar)	B1-1112	133.66	138.00	166.00
French DOM (sugar transport and refinery)	B1-1113	15.99	16.00	18.00
Sugar sector (price gap preferential imports)	B1-1119	58.68	41.00	41.00
Food processor (olive oil)	B1-124	21.16	24.00	24.00
Animal husbandry (milk)	B1-2029	0.5	p.m.	p.m.
Food processor (butterfat)	B1-204	460.10	450.00	425.00
Spirit drinks industry (cereals)	B1-300	2.41	1.00	1.00
Food processor (cereals)	B1-3010	61.58	67.00	20.00
Food processor (sugar)	B1-3011	179.80	193.00	156.00
Food processor (milk)	B1-3012	102.32	64.00	142.00
Food processor (butter)	B1-3013	87.82	86.00	90.00
Food processor (eggs and others)	B1-3014 B1-3019	4.96	4.00	6.00
Total		1,418	1,356	1,348

Source: Official Journal of the European Union, L54, 28.02.2003.

### 3.2.4 Impact on cohesion

It has been discussed above and also widely in the literature and to some extent in the political debate that reductions in agricultural price support would lead to efficiency gains for the agricultural sector, for the economy as a whole and also for the transfer efficiency of support to agricultural producers if price support is substituted by other more targeted forms of support. However, a widely neglected point is that a continuation of such reforms would also have a positive dimension in terms of equity. Cohesion countries would largely gain, as current 'hidden' transfers from their countries to other Member States could be significantly reduced.

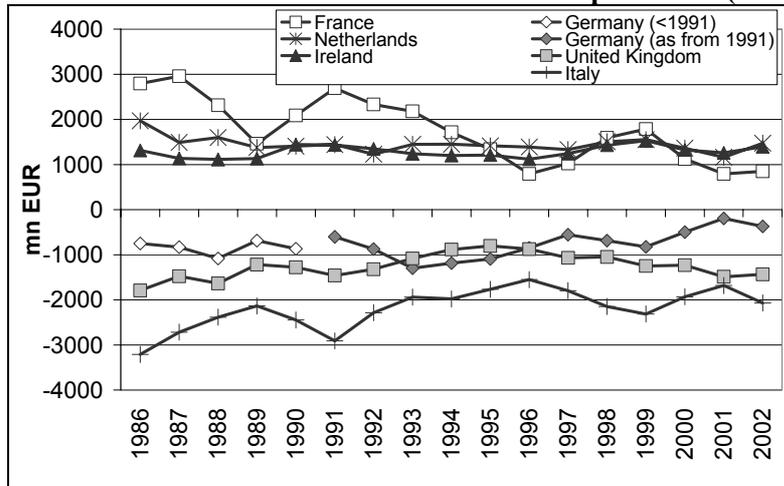
Cross border transfers from consumers to producers are often neglected in the debate on price reforms and also in discussing the impact of policies on cohesion. OECD estimates only give aggregate figures of consumer transfers at EU level. Therefore, the analysis below estimates for a series of commodities the part of the price support that consumers pay in each Member State to the benefit of producers in other Member States. All Member States' production and consumption levels were taken account of using 17 products<sup>5</sup> for which the OECD provides aggregate data on 'transfers from consumers to producers' at EU level. A net-position of consumer transfers can be derived for each Member State for individual commodities and for the aggregate of all commodities analysed. Figure 20 gives an overview of the net position of six Member States from 1986 to 2002. These Member States represent the three most (least) beneficial positions<sup>6</sup> as consumers in these countries support the sector less (more) than what their producers receive in price support from EU consumers of other EU Member States. Other countries' net positions are less extreme (in absolute terms). A positive figure indicates the level of transfers producers in a country receive from consumers of other countries. Conversely, a negative figure indicates the

<sup>5</sup> Beef, sheep, pig meat, poultry, milk, eggs, common wheat, durum wheat, barley, oats, maize, rice, refined sugar, potatoes (starch), soybeans, rapeseed, sunflower seeds.

<sup>6</sup> The actual situation might deviate to some extent from this analysis as for instance some countries might have considerable net-exporting positions of the processed products to other member states (e.g. ham). The burden in these countries would thus be lower than assumed here, where the consumption of the raw material has been the basis of distribution calculations.

amount consumers of a country transfer to producers in other countries. The main products missing for which some level of consumer transfers can be observed are olive oils, wine, cotton, and some fruits and vegetables. As the price support and/or the production level are relatively low the inclusion of these products would not change the outcome significantly. In the 17 year period Italian (British, German) consumers transferred around 37bn€ (21bn€, 13bn€) to producers in other Member States, while the French (Dutch, Irish) producers received 30bn€ (25bn€, 22bn€) of transfers from consumers in other EU countries. Besides the levels of cross border transfers the figure shows their decline during the 1990ies which is basically due to reforms in the cereals sector where price support has largely been substituted by direct payments. For Ireland (and the Netherlands) these ‘hidden’ net receipts have been significant and reached nearly 3.9% (0.6%) of GDP in current market prices in 1990.

Figure 20: Net cross-border transfers from consumers to producers (1986 – 2003)

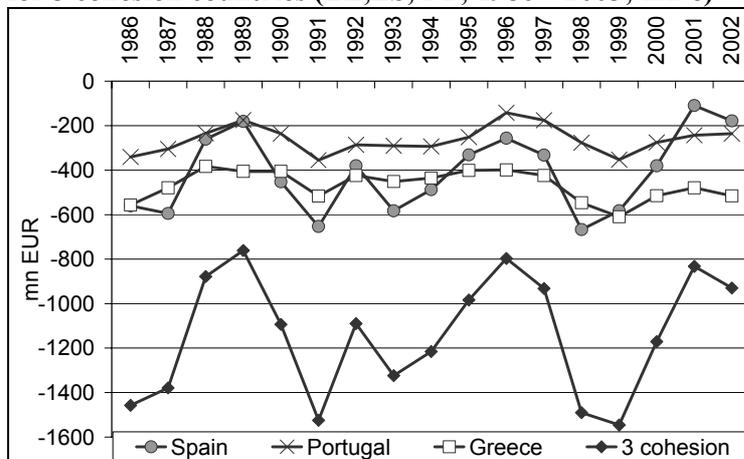


i.e. transfers from consumers in other countries to producers in country x  
less transfers from consumers in country x to producers in other countries

Source: base data from OECD (2003) and EUROSTAT; own calculations.

The analysis supports the findings from the ESPON Project (2003) in their 3<sup>rd</sup> interim report that the CAP ‘works especially counter to the objectives of economic and social cohesion’. Figure 21 shows the development of net transfers for the three Mediterranean

Figure 21: Net cross-border transfers from consumers to producers for 3 cohesion countries (EL,ES, PT; 1986 – 2003; mn €)



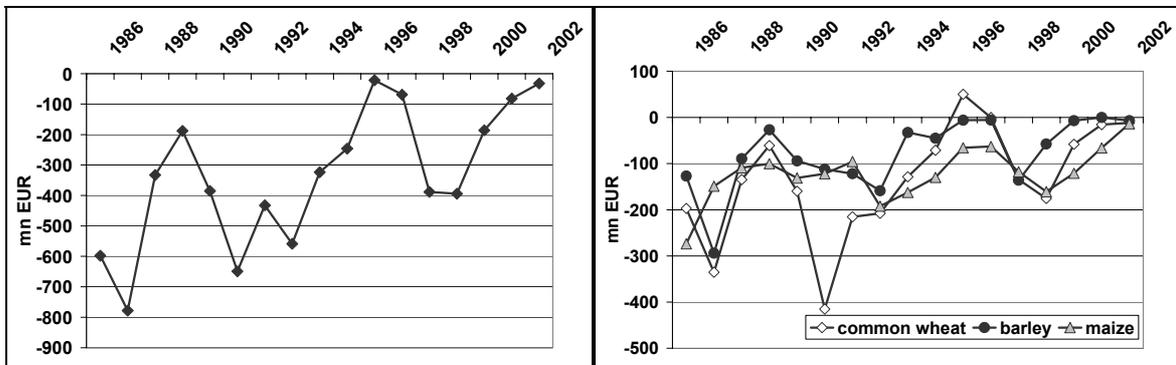
i.e. transfers from consumers in other countries to producers in country x  
less transfers from consumers in country x to producers in other countries

Source: base data from OECD (2003), EUROSTAT, own calculations.

cohesion countries. In total consumers in these countries transferred more than 19 bn€ to producers in other Member States from 1986 to 2002. While the trend is positive (decreasing transfers) for Spain and slightly positive for Portugal, Greece's position worsened to some extent. It is the beef, milk, and sugar sector which mainly cause their unfavourable position. These countries should, thus, from this perspective be strong supporters of a reduction of price support in these products.

Figure 22 shows the development for these three countries for the cereals sector where major reforms have been achieved. While in the late 1980ies consumers in these countries have transferred up to nearly 800 mn € per year to producers in other Member States, these transfers have nearly disappeared by 2002. Reforms in the beef, milk, and sugar sector would similarly improve the cohesion countries' situation if some new efforts could be initiated. Figure 23 shows that from the perspective of cohesion countries the situation has not improved in recent years.

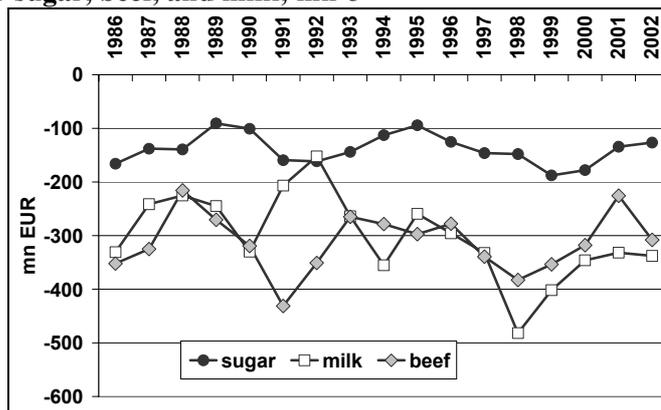
**Figure 22: Net cross-border transfers from consumers to producers for 3 cohesion countries for three main cereals (aggregate: left; disaggregated: right; mn €)**



i.e. transfers from consumers in other countries to producers in cohesion countries  
less transfers from consumers in cohesion countries to producers in other countries

Source: OECD (2003), EUROSTAT (2003), own calculations.

**Figure 23: Net cross-border transfers from consumers to producers for 3 cohesion countries for sugar, beef, and milk; mn €**



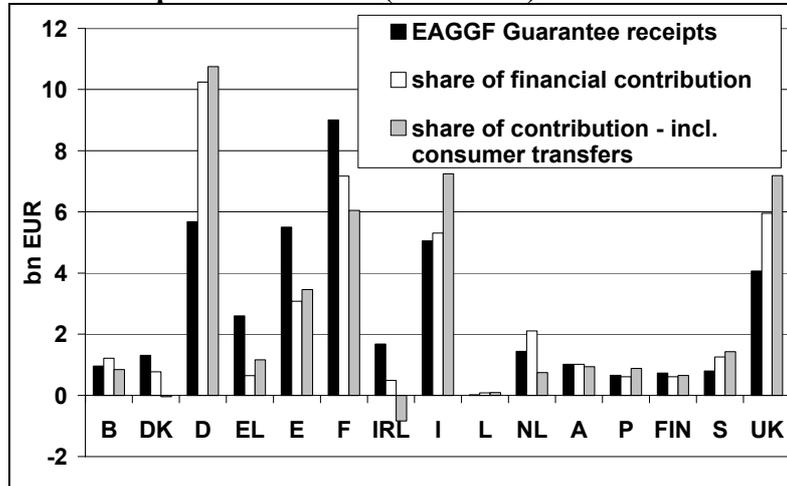
i.e. transfers from consumers in other countries to producers in cohesion countries  
less transfers from consumers in cohesion countries to producers in other countries

Source: OECD (2003), EUROSTAT, own calculations.

For the overall analysis one has to add that cohesion countries and other countries are substantially gaining from EU budgetary transfers. From the EAGGF-Guarantee section at least Spain and Greece receive significant financial support. As many groups are interested in the simplistic financial (not the economic!) effects of certain policies for certain countries, they are calculating net financial positions. Figure 24 shows the receipts and

contributions to and from the EAGGF-Guarantee section for the year 2000 as an example. For the contributions the share of the own resources is used, leaving out the traditional own resources. The Member States' contributions to this policy change significantly, if consumer transfers are added. For 9 Member States the contribution is higher than the simple budgetary net position would indicate.

Figure 24: Financial receipts from EAGGF (Guarantee) and contributions in 2000 (in bn €)



Source: DG BUDG (2002) and own calculations.

### 3.3 Dealing with price volatility

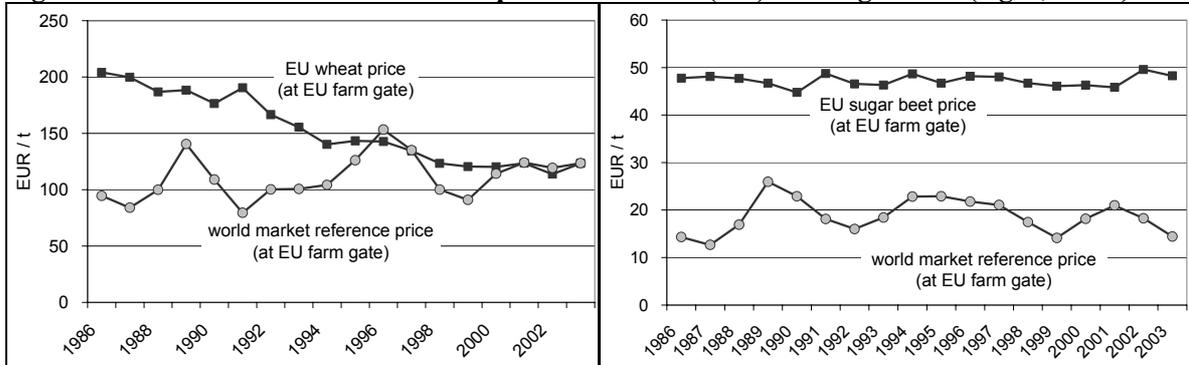
A reduction in market price support would not only improve economic efficiency, but it would also prove beneficial in terms of equity as cohesion countries could widely gain from unbiased market prices. On the other hand, critics of a further liberalisation rightly argue that, without market price support, volatility of agricultural commodity prices would increase in the EU and that it could lead to less stable gross margins for the farmers. However, there are several market mechanisms in place which could to a large extent serve as a buffer to stabilise farm incomes. These market mechanisms add to the income stabilising effect of single farm payments.

#### Stabilising effect of price support

Currently CAP market measures not only increase price levels of agricultural commodities as shown above, but they also stabilise prices in cutting the link to the world market. Import tariffs and export subsidies for major agricultural commodities balance differences in internal and external prices such that internal price developments are to a large extent disconnected from external price developments and are more stable. Only in those situations where world market price levels temporarily rise above EU-support levels, world price volatility directly affects the internal price level. The following four graphs compare the domestic producer price developments (at farm gate) with an international reference price (also at farm gate). The yearly fluctuations are clearly smaller at EU level. For the milk and the beef sector the variance is four to five times higher at international level, while for sugar and common wheat the correlations between domestic and international prices are even negative. One can conclude that without market price support price volatility will increase in the EU. It needs to be pointed out, however, that for many price movements market agents have prior information. Price volatility is, thus, not equal to price uncertainty. Only the unexpected parts of the price movements form an uncertainty issue for the market agent.

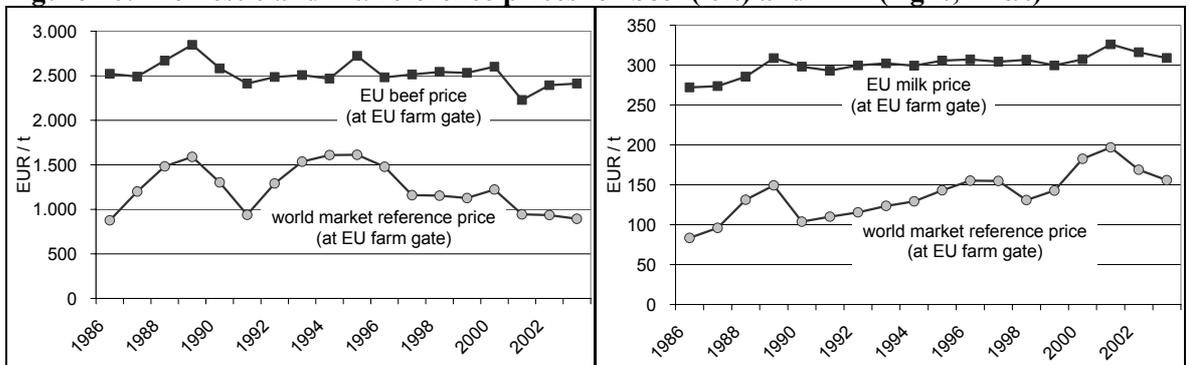
The four graphs also show that in the cereals sector domestic price levels have been brought down to international price levels while in the sugar, beef and milk sectors domestic prices remain significantly above international price levels. Thus, for the cereals sector prices will probably move more in parallel with international prices in the future.

**Figure 25: Domestic and int. reference prices for wheat (left) and sugar beet (right; in €/t)**



Source: OECD (2004)

**Figure 26: Domestic and int. reference prices for beef (left) and milk (right; in €/t)**

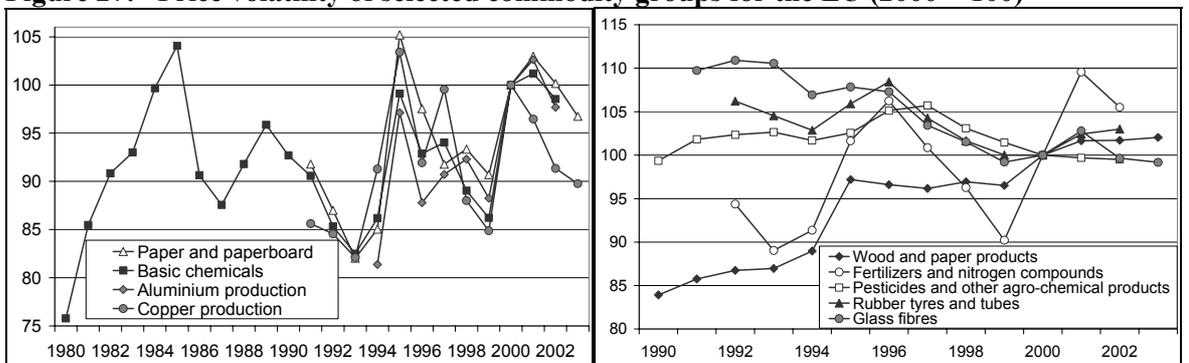


Source: OECD (2004)

### Price volatility of commodities and services in other industries

Relatively large price fluctuations are not a particular problem for producers of agricultural commodities. Price volatility is equally high or even higher in those industries producing for instance commodities using a highly volatile major input such as oil (basic chemicals, fertiliser) or facing highly volatile demand and supply situations (micro chips, paper products, ice cream). Some volatile groups of commodities are shown in Figure 27 for illustration.

**Figure 27: Price volatility of selected commodity groups for the EU (2000 = 100)**



Source: EUROSTAT (2004).

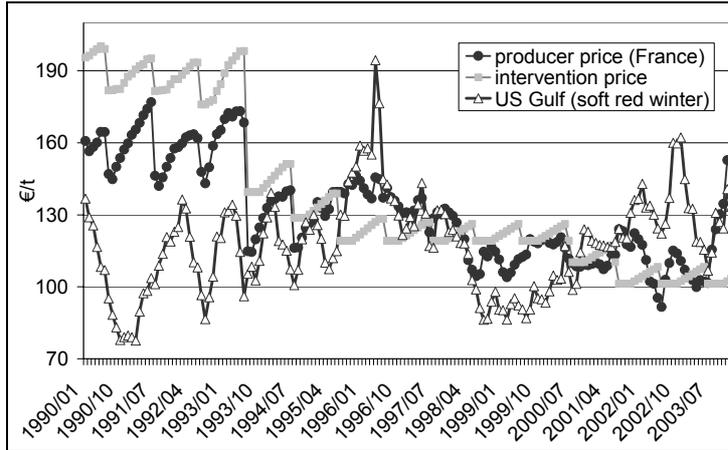
The producers of these commodities all have to cope with their respective price volatility. They are using several market based instrument to reduce the impact of the volatility on their revenue. Besides long-term delivery contracts with fixed prices and other bilateral contracts such as forward contracts, they are using commodity futures and/or futures on exchange rates to hedge their price risks. European producers and traders of agricultural commodities have similar possibilities and would per se not need additional governmental support to cope with these risks. This holds in particular as current market price support policies are phased out over time and are compensated by income stabilising direct payments.

It also needs to be added that the increasing volatility in, for instance, the cereals market where internal prices nearly reach international ones, is mainly a 'positive' volatility for producers. An intervention price is still in place which serves as a quasi minimum price.

Furthermore, several studies have indicated that a price liberalisation of agricultural markets in industrial countries will be likely to lead to a reduction of world market price volatilities of agricultural commodities currently being produced and protected in the northern hemisphere. This should hold especially for reducing price support policies in the EU. For several agricultural commodities EU producers and consumers are not responding to varying world market price signals as internal prices are more or less fixed. Thus, e.g. in a situation of falling world market prices European consumers do not have the incentive to increase consumption and the producers would not reduce their production, which would happen under liberalised conditions with a counter-effect on world market prices. As the EU is a major player on the world market and can be considered a large country within trade theory, the missing link to the world market and the non-response to price signals should, thus, tend to increase world market volatilities (compare TYERS AND ANDERSON, 1986; WONG, STURGISS AND BORRELL, 1989).

### **Potential benefit of using the futures market**

With a reduction in EU-price support the food industry and the producers are increasingly confronted with the more volatile world market prices. Although THOMPSON, HERMANN, and GOHOUT (2000) show that the increase in price risk was negligible until 1998, with further reduction of the price support, this will become more severe in the future, but is fully in line with the Commission's view of a market based agricultural production. The matter is illustrated in Figure 28, which shows the development of the intervention price for wheat, the world market price (here: fob gulf) of a comparable quality and the producer price for wheat in France from 1990 to 2003. Up to the implementation of the 1992 CAP reform, the producer prices within the EU followed closely the pattern of the intervention price depending on the quality and on the distance to the intervention spots. Till then they had no significant link to world market prices. With the reduction of the price support the intervention price serves more and more as a minimum price for the producers and the world market price influences the EU-producer price at times with a relatively scarce supply situation. Hence, producer prices become more volatile and – more importantly – less predictable, and the demand for price forecasts and for tools of price risk reduction will increase. Futures exchanges can serve these needs. They can assist in stabilising agricultural income, without the need for subsidisation and without being economically distortive, as most policy measures for stabilising incomes are. For being fully market based the stabilisation is done around the market trend. This is, therefore, contrary to normative measures, like fixed prices, which are by definition economically distortive by not having direct links to market developments. Futures markets can serve as a tool against unexpectedly changing prices, but they cannot serve as a tool against an unfavourable trend in prices. Annex 3 explains the functioning of the futures market.

**Figure 28: Producer-, Intervention-, and International Wheat Price (1990 – 2003)**

Source: International Grains Council, EUROSTAT.

Strong, not foreseeable price movements feature a high risk for entrepreneurs. In agriculture this holds in particular for:

- arable farmers without or with little storage capacity, as they are forced to sell their produce at harvest time;
- pig producers using the in/out-method of producing<sup>7</sup>, as they have a low spread of risk;
- marginal producers<sup>8</sup>, as they have less potential to cover huge losses; and
- producers with a low ratio of own land and capital and a high ratio of hired labour, as they more easily run into solvency problems.

Structural development leads to an increase of the latter group (see section 2.3.2). Some standard policy measures to tackle risks for all these groups are for instance the support of private storage capacities, the provision of income transfers in the event of unexpected price drops, or the support of family farms for their greater potential to withstand irregular drops in prices. While these widely used measures have implications on the efficiency and the structural development of the sector, the use of futures markets serves the same needs and is still fully market oriented without distorting effects. The producers not using it either have other risk management tools (e.g. family farms), or do not have knowledge about the use of futures, or calculate that the costs exceed the benefits. The following section gives an illustration of how the use of futures markets can significantly improve the income stability of farmers in comparison with other risk management strategies.

### 3.3.1 Risk management strategies – case study on Northern German pig producers

The case study below concentrates on the stabilisation of gross margins which is considered a key variable in the context of stabilising income from farming. Simulations are carried out for an average pig meat producer in Northern Germany using actual price data for pig meat and the major inputs (piglets and feed) from 1991 to 2003. The fictitious producer is assumed to have average productivity (~680g daily uptake, 3.5% losses). Figure 29 (left) shows the development of prices for pigs and the prices for the major inputs – feed and piglets. Pig prices have been relatively volatile and, furthermore, followed a downward trend. While input costs have fallen as well, thus preventing strong drops in gross margins, the uncertainty for gross margins remains.

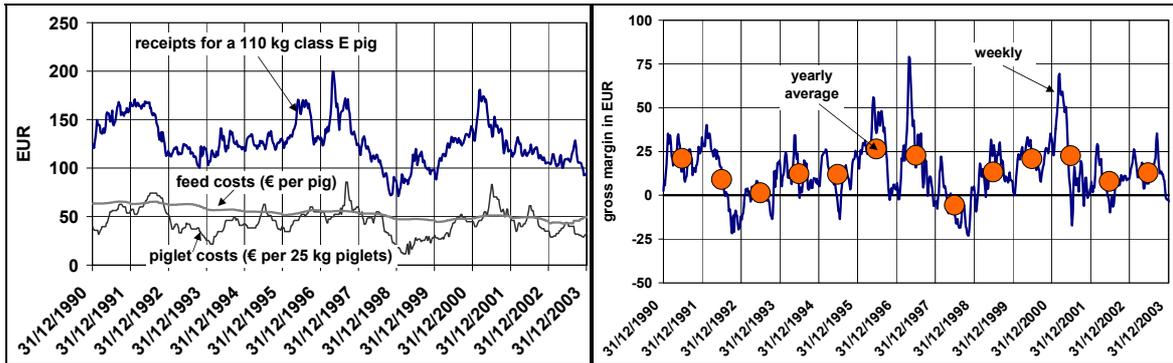
<sup>7</sup> Whole stables or large sections are filled (emptied) en bloc (e.g. every 18 weeks), from which scale economies can be realised and the disinfection of the stables is more effective. Continuous selling strategies (e.g. weekly sales) are more labour intensive.

<sup>8</sup> I.e. producers whose variable costs of production are just covered by the market price.

**Continuous selling strategy**

Weekly gross margins of producing pig meat are relatively volatile. Figure 29 (right) shows the development for an average producer in Northern Germany. A pig meat producer has the option to reduce the volatility in gross margins by maintaining or shifting towards a continuous selling strategy<sup>9</sup>. It reduces to some extent the volatility of his gross margins, as he avoids selling larger quantities of his output at up-or downward peaks of prices. His yearly gross margin would be the average of weekly gross margins (see dots in Figure 29).

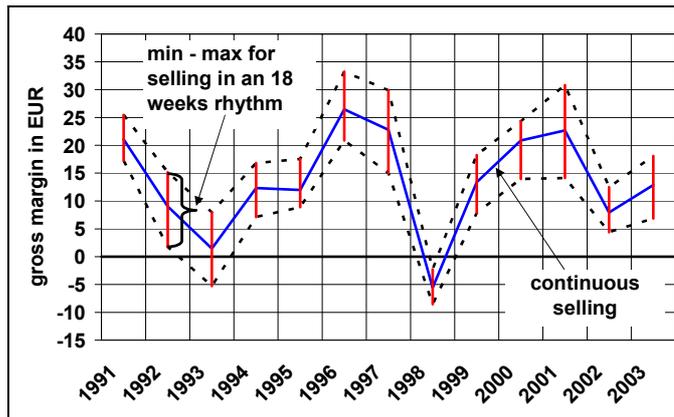
**Figure 29: Input Prices and Pig Prices (left) and Gross Margins per Pig (110kg; right)**



Source: LOY, V. PFEIL AND WICHERN (2004) mimeo: piglet and pig prices in Schleswig-Holstein (Landwirtschaftskammer SH, prices for class E pigs (average prices of sample firms), basis price for BHZP-piglets, feed costs from ZMP (2004)).

In Figure 30 the gross margin of a continuous selling (central line) is compared to an in/out (every 18 weeks) strategy. In the latter case the yearly gross margin depends on the starting point of the 18 weeks rhythm and oscillates between the two dotted lines indicating a higher volatility of gross margins. Furthermore, with the continuous selling strategy the risk of a negative gross margin is lower. In the period examined it was only the case in 1998, while with an in/out strategy the risk of a negative gross margin was also high in 1993.

**Figure 30: Yearly average gross margins with continuous and in/out strategy (€/110kg pig)**



Source: LOY, V. PFEIL AND WICHERN (2004) mimeo.

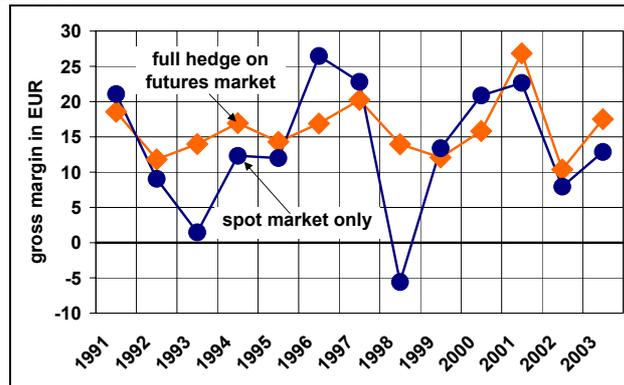
**Using the futures market for hedging purposes**

What would have been the effect of hedging the entire production for the average producer in the period 1991 – 2003? Without hedging on the futures market the yearly averages of gross margin varied between minus 5.6 and 26.5 €/kg. The use of the futures market

<sup>9</sup> As mentioned above this strategy would most often be more labour intensive and would derive less scale economies.

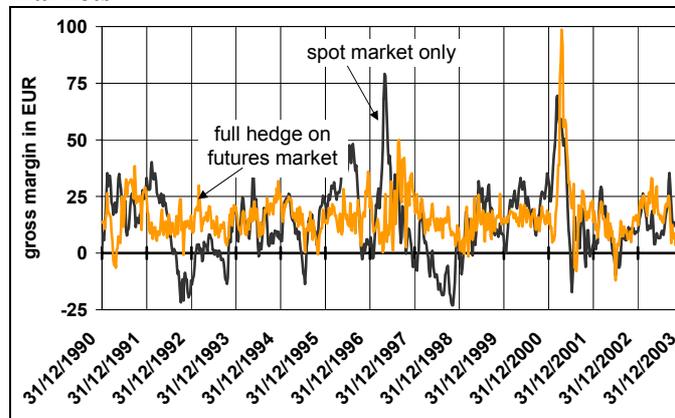
including the hedging costs<sup>10</sup> would have stabilised it between 10.4 and 26.8 €/kg. Thus in comparing the continuous selling strategy with and without the use of the futures market (Figure 31) the yearly gross margins can be significantly stabilised if futures markets are used. Figure 32 shows the same on a weekly basis. Although one can see that the average gross margin over the period as a whole was slightly higher for the hedging producer, this will not be the case in the long run. At times with a falling price trend (like in the 1990ies) the hedging producer will be better off, while with a rising price trend the opposite is the case.

**Figure 31: Instability of yearly gross margins (€/100kg) with and without the use of futures markets**



Source: LOY, V. PFEIL AND WICHERN (2004) mimeo: future prices used from Euronext (2004).

**Figure 32: Instability of yearly gross margins (€/100kg) with and without the use of futures markets**



Source: LOY, V. PFEIL AND WICHERN (2004) mimeo: future prices used from Euronext (2004).

### Using the futures market for forecasting

Without actively using the futures market producers could also utilise it to forecast future commodity prices. For the period above a producer with naïve expectations (i.e. assuming constant output prices for the 18 weeks production cycle) would realise a goodness of fit<sup>11</sup> ( $R^2$ ) of 41%. If the producer used a simple dynamic autoregressive trend model the  $R^2$  of

<sup>10</sup> It is assumed that the whole production of 5000 pigs annually was hedged, that 100 pigs are sold per week, that 1 contract (for around 100 pigs) with 18 weeks maturity is bought with 100 new piglets each week, that the opportunity costs of capital is 7.5% for the initial margins and margin calls (against 2.5% interest on the margin payments received), and the round turn costs of 75 € per contract. Other production assumptions are stated in the text above.

<sup>11</sup> The goodness of fit or  $R^2$  measures the proportion or percentage of the total variation in observed values explained by a regression model.

forecasting commodity prices 18 weeks in advance already increases to 48%. In utilising the futures prices, on the other hand the  $R^2$  is 60%. Producers could therefore also use the futures market as a tool for improving production decisions. In situations of unfavourable prices the producers could reduce or stop production.

### **Vertical Integration of Piglets Production**

In the production of pig meat the main cost of production are the feeding costs. As this part of the input costs is relatively stable, it is not a major issue in terms of risk management. The purchases of piglets, however, form a relatively volatile part of input costs. Thus, the question arises about the benefits of integrating the piglets production to stabilise the input costs of piglets. This option can certainly stabilise the input payments and avoid solvency problems. However, in economic terms the costs of piglets are not constant on vertically integrated farms, as the value of the piglets changes according to the prices at which they could be sold on the market. These opportunity costs for piglets are neglected. Due to the positive covariance between pig prices (slaughtered) and piglets prices (18 weeks back)<sup>12</sup> the instability of the gross margin is increased by 60 %, if the piglet prices are kept constant. Although this might be surprising, it is caused by the fact that high piglets prices flatten the gross margin curve at times of high pig meat prices and vice versa. Hence, the positive correlation of these two prices actually stabilises the gross margin and vertical integration increases the instability of gross margins<sup>13</sup> in economic terms.

One can conclude that in terms of income stabilisation the use of the futures markets is more appropriate than a continuous selling strategy alone or the vertical integration of production.

### **3.3.2 Farm household income volatility**

For the individual farmer the key variable in terms of income security is the volatility of farm household income. It comprises on the one hand (usually stable) non-farm income and on the other hand farm income, which is usually derived from different farm activities. Some on-farm incomes are relatively stable, while others are less stable, but with potentially uncorrelated fluctuations which thus reduce the overall risk of income volatility. It follows that the degree to which an individual farm household is prone to income uncertainty depends largely on the share of (stabilising) off-farm income on the one hand and on the production mix on the farm on the other hand. The ability of farm households to cope with on-farm revenue fluctuations is also dependent on the degree of utilising own land, labour and capital. A higher share reduces the liquidity risk.

#### **Share of off-farm income**

For EU farm households the relatively low degree of income from farm sources shows that off-farm income is significant in the EU. According to FOLMER ET AL. (1995) the share of farming income varies between about one third and three quarters of total household income. For Italy they give 31%, for Denmark 39%, for West Germany 47%, for the UK 57%, for France 62%, for Ireland 68% and for the Netherlands 77%. More recent information from the OECD (Figure 33) gives a similar range of farming income shares for OECD countries. The ratio of on/off farm income is also relatively stable over time (OECD 2003). As the off-farm income is usually quite stable, the importance of potential on-farm income volatility is highly reduced. For the sector as a whole farm household

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<sup>12</sup> The coefficient of variation is  $x$  for taking the prices of the same week and  $x$  for taking piglets prices 18 weeks prior to the pig prices.

<sup>13</sup> The advantages of vertical integration are ignored here. The adverse selection problem in buying piglets is avoided and as less diseases are imported, the mortality losses will likely be reduced and the "daily added weight" of the pigs produced will be improved.

income volatility per se seems not to be a key problem. This is supported by OECD calculations summarised in table 4. The off-farm income significantly reduces the volatility (here the coefficient of variation) of the total farm household income.

**Table 4: Income variability in selected OECD countries**

(In national currency, deflated by the GDP deflator, 1995=100)

Coefficient of variation <sup>1</sup> over the period	Australia	Canada	Denmark	Japan	Norway	United Kingdom	United States
	1989-99	1989-97	1989-99	1990-2000	1989-99	1988-98	1991-99
Farm income	0.49	0.12	0.16	0.13	0.14	0.14	0.28
Total income of farm households	0.31	0.06	0.08	0.03	0.06	0.07	0.14
Total income of all households <sup>2</sup>	0.12	0.01	n.a.	0.04	n.a.	n.a.	0.08

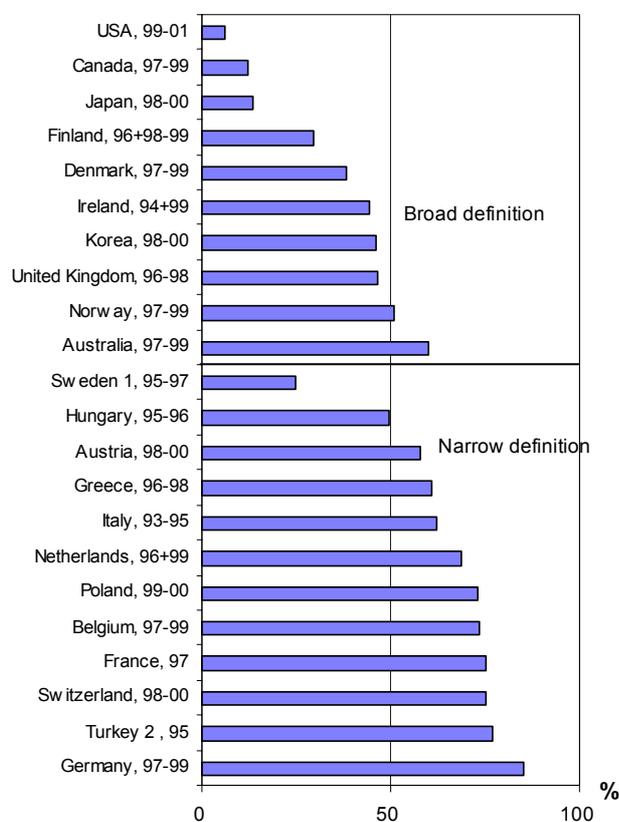
n.a.: not available.

1. The coefficient of variation is the standard deviation divided by the average for the period.

2. Except for Japan, where it is workers' households.

Source: taken from OECD (2003); GDP deflator from OECD *National Accounts* database.

**Figure 33 : Percentage share of farming income in total farm household income**  
(average of the three most recent years available)



In some countries the share of farm income is overstated (narrow definition above). Farms with a very low share of farm income are excluded from the data, which gives an upwards bias in the aggregate data.

1. Sweden: Income from independent activities.

2. Turkey: Agricultural households in rural areas.

Source: taken from OECD (2003) based on national statistics and EUROSTAT.

### The degree of specialisation

The degree of product specialisation is another indicator of the degree to which farmers are prone to the risk of unexpected income shortfalls. The lower the specialisation, the more stable the farm income usually will be. Diversification is one of the risk management strategies farmers utilise. Table 5 shows that the majority of income derived in agriculture

**Table 5: Importance of different farm types in 2000 (in %)**

	No. of holdings	Utilised agricultural area	Livestock units	Standard gross margin
Specialist cereals, oilseed and protein crops	12.6	22.1	2.5	12.8
General field cropping	8.3	10.0	2.4	11.4
Specialist horticulture	2.7	0.6	0.1	8.0
Specialist vineyards	7.2	2.2	0.1	6.5
Specialist fruit and citrus fruit	7.9	1.6	0.1	4.2
Specialist olives	14.1	2.9	0.2	3.8
Various permanent crops combined	6.2	1.6	0.2	3.6
Specialist dairying	6.8	12.8	23.0	16.8
Specialist cattle-rearing and fattening	4.8	7.9	10.6	3.3
Cattle-dairying, rearing and fattening combined	1.0	1.8	3.0	1.6
Sheep, goats and other grazing livestock	9.0	13.6	10.0	4.2
Specialist granivores	1.5	1.1	22.7	5.4
Mixed cropping	7.9	5.0	2.1	5.1
Mixed livestock, mainly grazing livestock	1.9	1.8	2.9	1.5
Mixed livestock, mainly granivores	0.8	1.0	4.5	1.5
Field crops-grazing livestock combined	3.6	9.7	8.2	6.9
Various crops and livestock combined	2.9	2.8	7.4	3.4
Non-classifiable holdings	0.7	1.6	0.0	0.0

Source: EUROSTAT, Farm Structural Survey 2000.

stems from farms being either quite diversified or specialised in a production with relatively low income volatility. Specialised dairy farmers derive at least two thirds of their standard gross margin from dairy cattle and are, thus, relatively prone to yearly variations in milk prices. However, as milk prices are supported and stabilised by the CAP (see also Figure A4 in annex) and milk yields are highly stable, dairy farmers' income is relatively stable. A similar situation holds for specialist cereals, oilseed and protein producers. Price support has been largely reduced for these products, while minimum prices (cereals) are still in place. The reduction in price support down to the minimum price for cereals has been compensated by direct payments, which are by definition stable. The remaining fluctuations of cereal prices are only upwards deviations from the minimum price. In other words, all fluctuations are beneficial for the farmer as they can only deviate positively from the minimum price. One can conclude that most of agricultural production stems from non-specialised farms or from specialised farms with a low income volatility of the dominant type of production. Even those specialised farms with a volatile dominant crop (> two third of gross margin) like vineyards or fruit producers often seem to have some degree of diversification which is indicated by some livestock units on these farm types.

### The expenditure side

The main cause of income variations stems from the revenue side as yields and prices fluctuate. While in regional autarky prices and yields have a negative correlation and thus a stabilising effect on revenue, this is less (or not) the case for most agricultural commodities which are traded on the internal market or (if the CAP allows) under world market conditions. The ability to cope with fluctuations in revenue is, however, also influenced by expenditures of the individual farm. The higher the share of own land, labour and capital, the lower is the liquidity risk in case of an unexpected fall in revenue. The importance of volatilities of on-farm revenue is thus much higher for larger and expanding farms which on average work with a much higher share of hired labour, rented land and liabilities. For the larger farms these fixed costs reach one third of their standard gross margin, while it is less than one sixth on smaller farms (table 6). The table also shows that full-time family

farms, which are dominant in the range of 19,200-120,000 € gross margin (16 – 100 ESU), have relatively less hired labour.

**Table 6: Fixed costs per gross margin in different farm size categories 2001**

Economic size unit (1200€ standard gross margin)	Number of holdings in '000 (1997)	total liabilities / ESU	interest paid / ESU	rent / ESU	wages / ESU	Interest and rent / ESU	Interest, rent, and wages / ESU
0 - <4	3531	75	5	21	163	26	189
4 - <8	1039	146	11	30	104	41	145
8 - <16	840	888	48	50	114	98	212
16 - <40	843	992	50	73	88	123	211
40 - <100	535	1294	63	101	85	163	248
>= 100	201	1376	70	107	217	176	393

Source: FADN data from DG AGRI

### Summarising risk management options

One can deduce from the above sections that farm households can utilise several risk management strategies to cope with potentially volatile farm household income. On the farms they can (i) produce those commodities which have a low yield and/or price volatility and (ii) diversify production in such a way that the overall income risk is reduced. Off-farm they can (i) derive off-farm income (from capital or labour) to stabilise household income (off-farm diversification) and (ii) certainly benefit from the stabilising progressive tax systems and the social nets established in the Member States which also hold for the farming community. Other farm business related strategies are the use of marketing contracts (forward contracts), vertical integration, the use of the futures and options market or the use of existing yield insurance schemes (e.g. against hail).

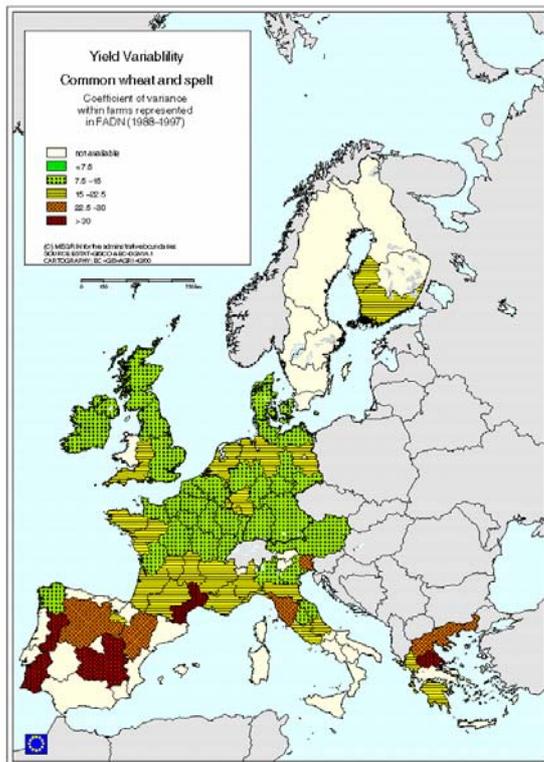
### Supply problems of risk management tools

From the supply side, companies providing risk management tools face some major difficulties. Futures exchanges in the EU have to compete against the price stabilising policy of the CAP and against the income stabilising effect of direct payments. Although price support is decreasing over time, the quantity traded on EU exchanges is rather low (see table 4 in annex 3) leading to profitability problems for most exchanges. Only for the least protected commodities such as e.g. potatoes and pig meat is the trading activity significant. Insurance companies on the other hand face more technical problems. The hail insurance is a rare example where yield insurance can work. The potential damage is local, the risk is spread over a large group, and the damage is clearly separable from management failures. This is not the case for many other causes of yield losses. A drought for instance is normally a systemic risk, which means that it affects a large group of insured persons at the same time. Systemic risks are, however, more expensive (or even impossible) to insure against as the demand for re-insurance increases for the insurer. Non-systemic risks such as hail, fire, car accidents etc are more evenly distributed across regions and time. Another equally important problem for yield insurance in general is the asymmetric information of insurer and insured. The insurer has difficulties to objectively distinguish between yield losses due to e.g. a drought from those due to management failures. Not all of the insured will truly give the correct information necessary (moral hazard), which leads to higher costs for the insurer than in absence of the asymmetric information problem. Thus, both systemic risks and moral hazard problems increase insurance costs and lead to levels of insurance premiums farmers are not willing to pay.

**Policy debate**

Although the above sections suggest that for the sector as a whole farm household income volatility cannot be the core problem and that only relatively few farms are particularly at risk, it is regularly discussed whether the EU should be more involved in the support of risk management – in particular of insurance schemes. Currently the CAP provides for income stabilisation in three areas. It (still) supports prices, it provides for substantial stable transfers through direct payments, and it gives large flexibility to Member States within the state aids regulations to provide financial support in cases of e.g. bad weather conditions or to give yield insurance subsidies on a regular basis. Member States have used this flexibility for many years. The discussion of a larger EU involvement, thus, more explicitly concerns further financial redistribution. Member States would have to pay less at the expense of larger costs for the EU agricultural budget (within which rearrangements would be necessary as the overall budget ceiling cannot increase). As the yield risk is higher in southern Member States (see e.g. Figure 34) it could also lead to north – south redistributions. There are more efficient ways of redistributions across the EU. The main arguments against a stronger involvement of the EU to support national insurance schemes or to establish an EU-wide insurance are, however, of a technical nature. As mentioned above there are asymmetric information problems in insuring yield losses, which may be the major cause of only few yield insurance schemes available on the market. The main effect of financial support would thus perhaps be to overcome the asymmetric information problem. Aids would implicitly go to those who cannot resist taking advantage of the moral hazard problem. Secondly, there is at least a risk that part of the aid will implicitly stay with the insurer which means that part of the agricultural aid is benefiting actors outside the sector. Thirdly, the support of yield insurance would give incentives to

**Figure 34: Wheat yield volatility in EU-15**



Source: DG Agriculture

specialise in more volatile type of productions or to utilise agricultural areas which are less suited for certain types of production. This has been observed as one consequence of the highly supported US insurance schemes for the agricultural sector.

One can conclude that further support in the area of agricultural price or yield insurance seems not necessary for most farm households. The asymmetric information problem could not be solved with public support. Any regional or farm type specific support, where it could be justified, should, however, remain at Member States level. The incentives for the national implementing authorities for a targeted and efficient use of money would be weaker with support coming from the EU.

## **4. Restrictions in Production**

The CAP has introduced several restrictions in agricultural production in order to reduce and/or control agricultural output. Budgetary and external pressures (e.g. WTO) to reduce the main policy support – the price support – have not been tackled directly but through limiting internal production. Restricting EU production limits the magnitude of export subsidies for EU surplus production and gives more room for manoeuvre to grant bilaterally preferential import agreements to third countries. Although production restrictions imply large losses of income forgone and of sectoral efficiency, directly reducing price support was seen as politically more difficult. The two main production restrictions are set aside obligations of agricultural land and the limitation of output levels of some major products (e.g. milk, sugar) through quota systems. The drawbacks of both types of restrictions will be shown below and it will be discussed to what extent the 2003 CAP reform has improved the situation.

### **4.1 Set aside**

Payments under obligatory and voluntary set aside schemes compensate producers for taking part of their land out of production. Without respecting the obligatory set aside restriction farmers would no longer be eligible for direct payments. In total nearly 6.1 mn hectares of agricultural land have been left idle under set aside (compulsory and voluntary) in EU-15 in 2002/03<sup>14</sup>. The main policy objective of set aside is the reduction of production area, as it is supposed to limit surplus production and thus budget expenditures. With the 2003 CAP reform an environmental objective has been added to the set aside measure. However, the hierarchy among these two objectives has become clear within a few months. For the 2003/04 crop season the 10% set aside restriction will not be binding following the relatively bad harvest in the previous season.

The inefficiency of set aside measures is twofold. Generally speaking, leaving a scarce factor of production unused in return for compensation will lead to losses in welfare. If the land in use generates a gross margin of x€ per hectare, this value is forgone for the farmer and for the society as a whole. While the farmer is compensated by transfer payments, society is still worse off by x€/ha. The set-aside restrictions, thus, fundamentally run counter to the general CAP objective of increasing productivity in the agricultural sector. According to KEYZER ET AL. (2003) the welfare loss of set aside is around 1.2 bn €. The abolition of set-aside restrictions would lead to additional realisable income for the farmers of more than 1% and the sectoral net value added could increase by about 2%. For land and labour alike, a general non-targeted use restriction to the benefit of the environment cannot be an efficient measure. The restrictions should only be applied in those (few) areas where the benefits are equal to or higher than the costs of non-use.

The measure has also limitations regarding its effectiveness in terms of reducing production. First of all, producers use their least productive land for set aside and additionally, abundant resources on the farms are used more intensively on the remaining land. The consequence is that one percent of set aside results in significantly less than one percent reduction in output. Furthermore, farmers are forced into uneconomic (non-) production to become eligible for direct payments.

The impact of set aside on the landscape has been at best neutral and environmental benefits attributed to set aside schemes have been assessed divergently. Furthermore, the

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<sup>14</sup> Of which 0.9 mn hectares have been industrial set aside (producing some non-food products).

process of reintroducing the land into normal production necessitates high input of mechanical work and herbicide use which for instance often harms animal population reproduction on fallow land. Hence, environmental objectives could be better achieved by directly targeted measures. The environmental value of temporarily leaving land idle differs significantly from region to region. If environmental benefits should be the main objective of set aside, the most suitable areas would have to be targeted across Europe. Furthermore, to be efficient, a tender system in each region could be used to allocate set aside land, instead of forcing each farmer (more and less productive ones) to leave parts of his land unused.

Finally, there are severe inconsistencies of the general set aside approach with other CAP policy measures. E.g. the main objective of payments for less favoured areas (one of the main Rural Development measures) is the avoidance of abandonment of agricultural land use. At the same time, the set aside restriction forces the farmers also in these areas to (temporarily) abandon 10% of their agricultural crop land devoted to the major subsidised crops.

## 4.2 Production quotas

Quota systems have been politically of interest for products receiving price support whose supply is increasingly exceeding internal demand. When the necessary price reduction is unacceptable for political reasons and the budgetary burden is reaching high levels a quota system was seen as a preferred solution. Sugar quotas have, for instance, been introduced in 1967 and milk quotas in 1984. With respect to an objective of maintaining high internal price levels while keeping the budgetary burden under control, quota systems are indeed quite efficient in the milk and sugar sector. From an economic point of view, however, production quotas should be abolished as basically quotas allow the maintenance of distorted price levels and they prevent the shift of production towards low-cost producers such that regional comparative advantages cannot be fully exploited. The development of more efficient structures in e.g. milk and sugar production is hampered.

The particularly distortive situation of the main sectors where quotas have been introduced (milk and sugar sectors) is summarised in table 7. Producers of these commodities are supported to the extent of around 23.4bn € per year which represents half of their gross receipts for these products. The main burden of the support was carried by consumers via higher price levels. Roughly 48% (milk) and 68% (sugar) of prices paid represent an aid element to producers, which add up to over 18 bn€ net in 2003. Thus, the consumers carry the burden of around three quarter of the support. Without the quota system, *ceteris paribus*, production would be significantly higher, the budgetary costs for export subsidies and/or intervention purchases would jump upwards, while the burden for consumers would not change.

**Table 7: Effects on Producers, Consumers, and Taxpayers (2003, in Mn €)**

	Milk	Sugar
Producer Support Estimate (PSE)	20,118	3,340
EU budgetary burden <sup>1</sup>	2,985	1,654
National payments	1,457	168
Net burden for consumers (CSE)	16,128	2,688
PSE	51%	63%
CSE	48%	68%
Self-sufficiency ratio (2002)	WMP/SMP <sup>2</sup> : 216%/114% Butter <sup>2</sup> : 112%	133%

<sup>1</sup>Budget for milk and milk products (title 05 03 01) and sugar (title 05 02 05);

<sup>2</sup>including subsidised consumption; i.e. without consumption subsidies the ratio would be higher.

Sources: OECD (2004) and DG AGRI (2004).

The welfare losses of price support have been described above. However, only the quota system for commodities of which the EU is a significant exporter can maintain the price support at such high levels without causing ‘major’ budgetary pressures. The quotas add to the inefficiencies of price support additional inefficiencies of production. Those are described below before the advantages of quota tradability are outlined, which could reduce the major inefficiencies of the quota system.

#### **4.2.1 Economic inefficiency of quotas**

The main drawback of a quota system is the restriction in the producers’ economic freedom to produce whatever quantity is most profitable to them and it, therefore, contradicts the fundamentals of a market economy. It is basically administrations that decide which region will produce how much milk or sugar. The outcome is likely to diverge from a free market situation where the production would move to the low cost areas which have a comparative advantage in producing the commodity in question. Finland has for instance an economic disadvantage in producing sugar beet and production costs in Finland are about twice as high as in France. However, EU legislation prohibits production from moving across borders. It is, hence, in contradiction with the Internal Market objectives and it is causing increasing inefficiencies in the agricultural sector as a whole. The quota system thus leads to an increase of the overall costs of production and worsens the competitive position of EU producers.

The effects of the quota system are illustrated in box 2. Restrictions in production cause a rise in production costs as all producers face restrictions, the efficient ones and the least efficient ones alike. This differs from the alternative, price support cuts, which would cause marginal producers to produce less. Hence, potential budgetary savings (and a – temporary – reduction in deadweight losses) from quota restrictions are counterbalanced (and likely outweighed) by the rise in production cost. In the long run, the negative effects further increase. Naturally, differences in production efficiency and profitability change over time. However, under the current quota regime production cannot move between regions and the agricultural sector cannot fully adapt and exploit regional comparative advantages. As these comparative advantages change over time, the negative effects of quotas on allocational efficiency increase over time as well. As in many less favoured areas, opportunity costs of using the land for other purposes than milk production is relatively low, those regions should often have a comparative advantage in milk production. Quota restrictions might thus likely hamper their increase in production and farm income.

The illustration makes clear that moving out of the quota systems is an economic necessity. As the quota system is linked to the substantial price support in the sectors, quotas cannot be simply abolished. The effect would be that production would increase quickly due to the incentives given from the price level. The secondary effect would be a strong budgetary burden, as all additional production would have to be exported with budgetary support. Thus, the abolition of quotas is, from a budgetary perspective, only possible with a reduction of price support. The lowering of price support as such brings along high welfare gains for the economy as a whole. In addition, with a gradual reduction in support the quotas become less restricting and they will finally lose their value leading to their de facto phasing out.

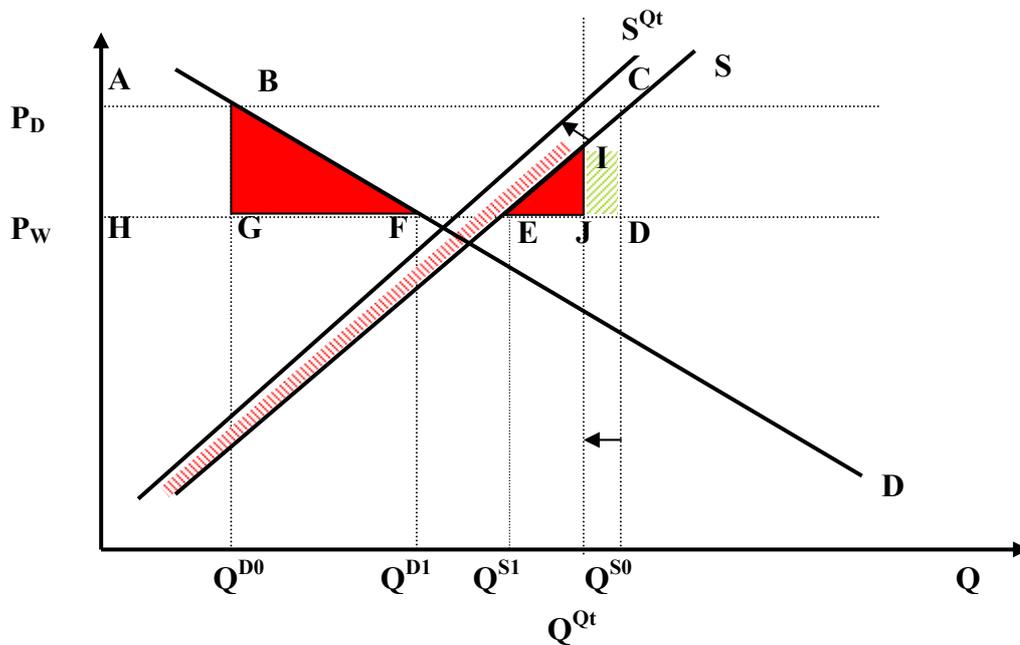
A means to accelerate the realisation of the efficiency and welfare gains linked to declining restrictions of quotas is the introduction of quota tradability. Since the introduction of the quota system the advantages of tradability have been highlighted (e.g. BRAATZ, 1991; COLMAN ET AL., 1998; COURT OF AUDITORS, 2001): the milk production moves faster

towards the low-cost producers and the (allocative) efficiency of the sector (including dairy processing) improves faster than with gradual price cuts alone.

**Box 2: Welfare Effects of Quota Restrictions**

The milk quota system has been introduced to restrict production for all producers. This causes a clear welfare loss as not only the less efficient marginal producers have to reduce their production but the most efficient producers (at the lower end of the aggregated supply curve) are restricted as well. This results in a rise of the overall cost of production. Therefore, the supply curve (= marginal cost curve) moves upwards (from  $S$  to  $S^{Qt}$ ) with the quota restriction (from  $Q^{S0}$  to  $Q^{Qt}$ ) which is stylised in Figure B2. The shaded area between the supply curves depicts the increased cost of production. At the same time the original welfare loss of price support ( $BFG+CDE$ ) is now reduced to  $BFG+IJE$ . The net effect is not necessarily negative in the short run. In the long term, however, the implied decelerating effect of structural adjustment certainly causes negative welfare effects in net terms. Originally quotas have been distributed according to historical production volumes. As efficiency gains are not evenly distributed across regions, comparative advantages change over time. The quotas, however, prevent production moving towards those regions with lower costs. Thus, the gap between  $S$  and  $S^{Qt}$  increases over time and, accordingly, so does the economic loss caused by the quota system.

**Figure B2: The Implications of a Quota System**



Source: own presentation (compare KOESTER, 1992, p. 295 or COLMAN ET AL., 1998, p. 17).

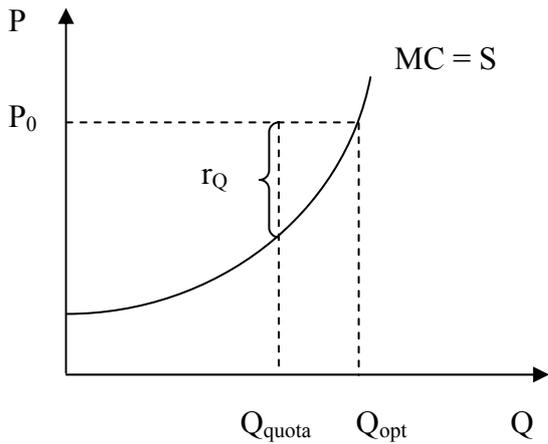
**4.2.2 Implications of Quota Tradability**

**Efficiency gains through quota trading**

Efficiency gains through quota trading are driven by the shift of production from the high to the low cost producers. The main shortcoming of the quota system as outlined in box 2 could be reduced to a large extent through quota tradability and thus increasing productivity of e.g. the milk sector. Quota trading can realise significant increase of income in the milk sector (see KLEINHANß ET AL., 2001). To illustrate the advantages of quota tradability, first the determination of the value of the quota is outlined.

Without quota restrictions producers would produce until their marginal costs of production equals the given product price. Figure 35 depicts the situation where quotas limit the total amount of production below this desired level ( $Q_{opt}$ ). Due to increasing

Figure 35: The Value of Quota

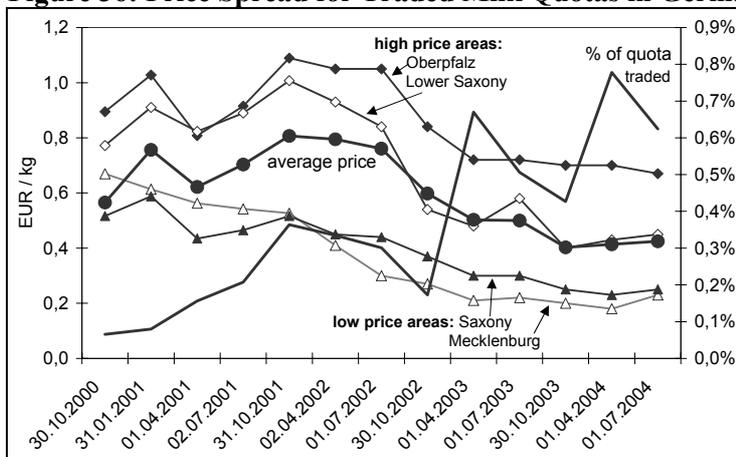


Source: own presentation

marginal costs of production this lower output level faces lower marginal costs of production and its difference ( $r_Q$ ) to the product price ( $P_0$ ) can be viewed as the value of the quota. This holds for all farmers in all regions - no matter if quotas are currently tradable or not. The degree of restriction through the quotas, however, does differ among farmers and regions and the ' $r_Q$ ' which is sometimes called the quota rent increases with the degree of restriction. Indeed, the quota rent increases with the product price, with a reduction of the quotas, and with efficiency improvements which shift the costs (and the curve MC in Figure 35) downwards.

For an illustration Figure 36 shows the variation of the quota value for 6 out of 21 German regions with 3 relatively high and 3 relatively low trading prices in the past 3 years<sup>15</sup>. The weighted average price and the share of traded quota relative to total production (RHS) are also given. While in Figure 35 the quota rent would be the value of the quota if leased for one year, the traded milk quota prices would represent the expected net present value of current and future quota rents.

Figure 36: Price Spread for Traded Milk Quotas in Germany



Source: [http://www.bauernverband.de/fr\\_top.asp](http://www.bauernverband.de/fr_top.asp) and own calculations.

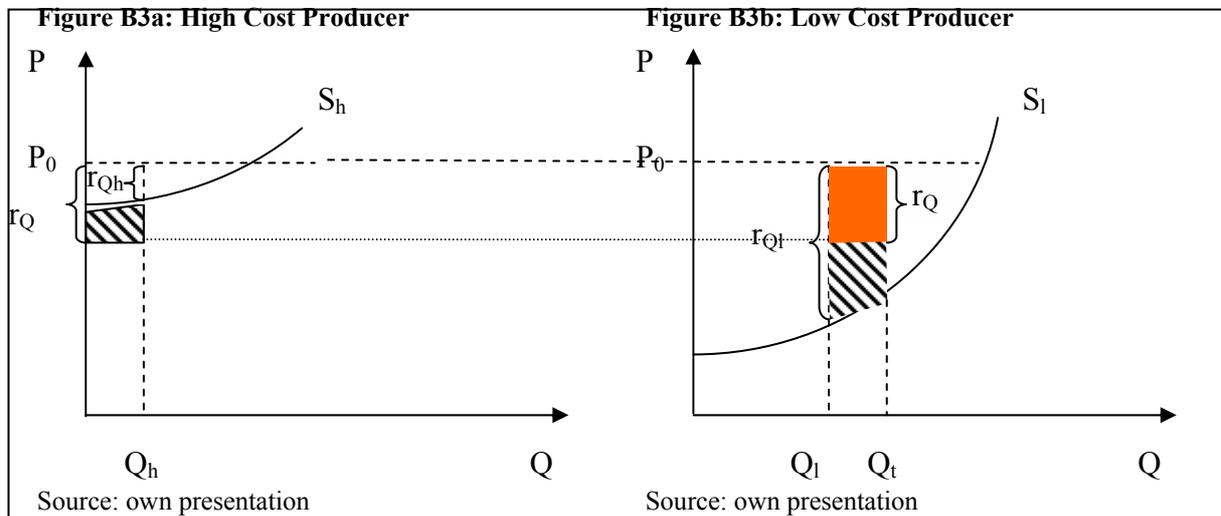
The strong regional differences within Germany indicate that substantial gains from trading across regions are possible. At least for the short term the regions currently paying higher prices seem to be more competitive and a shift to these areas would be favourable for the sector as a whole. Income would increase in the net buying and the net selling regions. KLEINHANß ET AL. (2001, p. 71 ff.) estimated a potential yearly income increase from Germany-wide trading of nearly 3.4% for the sector in Germany. This could be an underestimation as only short-term adjustments are modelled. With quota trading across EU Member States estimated gains are possibly higher. Another study indicates that

<sup>15</sup> The prices indicated in Figure 36 show the settlement prices on the relatively new exchange for milk quotas. The traded quantity is relatively low. However, these figures should give a good indication of the respective market prices for quota. Trading volume is also influenced by political uncertainty – end of 2002 the volume went down as the impact of the awaited CAP reform was still unknown.

French farms seem able to produce at 30% lower prices (1.45 against 2.07 FF /litre in 1996) if quota trading would be allowed within France (BEYNET, 2000). Annex 5 summarises the outcome of these two and other studies on impacts of milk quota trading.

How would quota trading work? In a situation where tradability is allowed, a producer could face three situations: If the market price for quotas is roughly equal to his personal quota rent  $r_Q$  he will neither buy nor sell quotas<sup>16</sup>. If the quota price is below he will likely<sup>17</sup> want to increase production as the additional quota bought or rented allows him to increase his income. The costs for the quotas are below his additional profit from production. Similarly, if the market price for quota exceeds his quota rent he will likely<sup>12</sup> want to decrease production. The revenue from selling or renting out some (or all) of his quota is higher than from allocating this quota to his own production. Hence, tradability allows for the exploitation of relative comparative advantages of regions or single producers. The production moves to producers with lower costs of production and the sectoral income as a whole will increase. Box 3 describes the situation.

**Box 3: Gains from quota trading**



Source: own presentation

Source: own presentation

It is assumed that producers face the same output price  $P_0$ . The high cost producer is less efficient and/or accounts for higher opportunity cost for his inputs used (e.g. land in fertile areas or labour for highly educated family labour). His profit from production is currently restricted to the area between the supply curve  $S_h$  and the price line  $P_0$  to the left of his quota level  $Q_h$  (see Figure B3a). The low cost producer (Figure B3b) is more efficient and/or has lower opportunity costs of his inputs used (often land in LFA). He is restricted to the quota level  $Q_l$ . Let us assume the two producers agree on a price  $r_Q$  for the quota<sup>1</sup> and the high cost producer sells all his quota  $Q_h$  to the low cost producer who pays an amount equal to the grey rectangle in Figure B3b and whose quota then adds up to  $Q_t$ . Both producers profit from this trade by an increase of income indicated by the respective striped areas. Figures B3a and B3b could interchangeably be seen as two regions which could gain from quota trading.

<sup>1</sup> In fact  $r_Q$  in Figures B3a and B3b is the annual depreciation of the quota price paid.

A necessary condition for realising these gains from quota trading is a clear policy perspective for the producers. The quota price depends not only on the cost structure and the output price, but also on the negotiating power of the parties involved and of their expectations from policy developments. A producer's willingness to pay is higher if he believes in the status quo of the current CMO and / or if he assumes a non-decreasing

<sup>16</sup> More precisely it is the net present value of actual and expected quota rents which the producers compare with the actual market price for quotas.  
<sup>17</sup> Assuming profit maximising objectives and rational behaviour.

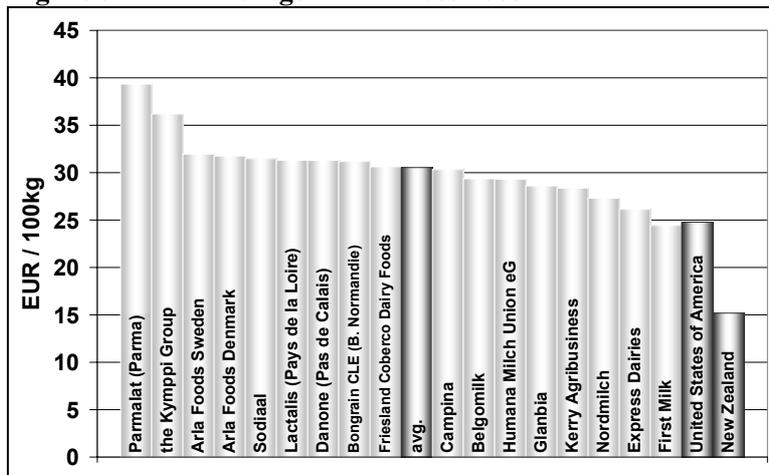
support. Long lasting and clear commitments of future policy developments and a transparent market are therefore necessary conditions for a well developed quota market. Unclear future developments would force producers to include a risk premium in their calculations of willingness to pay and quota trading and, hence, income increasing potential would be reduced.

Quota tradability would accelerate the strongly needed structural adjustments. HÜLSEMEYER<sup>18</sup> (2001) expects the savings potential for producers and the dairy industry in ‘shifting away from the scattered production’ to reach 4–5 €/100 kg within Germany. In fact it can be observed that, besides having a likely cost advantage in production, larger farms negotiate higher prices, arguing that transport costs (assembling costs) are lower for the dairy firms. It has to be pointed out that Hülsemeyer’s medium to long term estimate represents roughly 15% of the current milk price paid to most farmers in Europe. Price cuts of this magnitude could, therefore, be absorbed by the sector to a large extent in the medium to long term through structural adjustments on the producer side and within the dairy processing sector. Quota tradability accelerates the unavoidable adjustment process and allows productivity gains to materialise at an earlier stage. Furthermore, those farmers selling their quotas would do so voluntarily and only if it is more profitable for them, such that the enhanced structural adjustment includes an implicit compensatory payment for those stepping out of production and no further adjustment aid is needed from public sources. With future price cuts these least competitive farmers would move out of production any way, but will no longer be in need of support. Also those farmers who have increased their quota would have increased their profitability and could better cope with future price cuts.

### Implications at regional and farm levels

The output price level and the cost structures are the main determinants of the quota price. While the former has some regional differences (Figure 37) the latter differs significantly among farms and regions. It is certain that the efficient producers with low marginal costs using fewer inputs per kg milk through utilising larger herd sizes, high quality breed, modern equipment, and best management practises are able to pay, ceteris paribus, higher quota prices than less efficient ones for whom the benefit of expanding production should be smaller.

Figure 37: Average Milk Prices 2003



Excl. VAT, 4.2% fat, 3.35% protein, total bacterial count 24 999, somatic cell count 249 999 and a yearly delivery of 350 000 kg

Source: <http://www.milkprices.nl/>, own presentation.

<sup>18</sup> The former director of the German Federal Dairy Research Centre, Kiel.

Another important issue of cost structure, however, are the opportunity costs<sup>19</sup> of milk production. These differ significantly across regions. Dairy farms on permanent grassland (often in Less Favoured Areas) have only few alternative land uses with only low returns per hectare. Farmers in highly fertile areas where crop production can realise relatively high returns from the land face significantly higher opportunity costs. Therefore, a given level of output price reduction or increase of the price for traded quota leads, *ceteris paribus*, the farmer in the high fertile area to drop out of production more easily than the one producing on permanent grassland. Hence, with tradability, production will tend to move towards the efficient producers in regions with low opportunity costs.

Furthermore, quota tradability allows a medium-term phasing out of the quota system with lower price cuts. This holds because regions where the quotas are currently most restrictive would be able to expand. Without this option large price cuts would be necessary for these regions to make their quotas non-restrictive and worthless. Finally, assuming a significant average positive value for the quota, aggregate milk supply would stay stable even at significantly reduced prices. This is unlikely without the introduction of tradability.

#### **Implications at regional and farm levels where trading is currently not possible**

On aggregate the gains from quota trading are highest in regions where currently trading is not possible. This holds for most regions in the EU. Here the situation basically holds as outlined in box 2. It is likely that many producers currently facing a low quota rent  $r_Q$  take advantage of cashing in the value of their quota and at the same time many producers facing a high quota rent will have a high willingness to pay to increase production and their income. Hence, it is in particular these regions where quota trading would lead to a clear Pareto improvement, as none of the farmers are worse off than before and many are better off than without trading.

#### **Implications at regional and farm level where regionally trading is currently possible**

In some European countries (UK, DE) quotas are currently tradable on a regional level. In these regions significantly different quota prices are emerging (see Figure 37 for some of the 21 German regions) which reflects differences in regional profitability and indicates the large potential gains from an opening to interregional trade. However, for countries where intraregional trading is currently possible, the gains from interregional trading are likely to be smaller as some gains from quota trading have already been captured through intraregional trading. As following the introduction of interregional trade, quota prices will converge, sellers in formerly high price regions and buyers in formerly low price regions will lose, while the others will win. On aggregate the welfare will increase in all regions.

## **5. Direct Payments**

Since the 1992 CAP reform, direct payments play an increasing role in supporting EU farmers. Their importance will continue to increase and they are likely to form the core part of agricultural support in the future. Their original purpose was to temporarily assist farmers in adjusting to reductions in price support. Currently, they form a major part of Community support to the agricultural sector: out of 43.2 bn € in 2002/03 (EAGGF Guarantee) about 17 bn € have been used for direct payments for arable crops (incl. 1.7 bn

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<sup>19</sup> Opportunity costs of a decision are the value of the best alternative choice which is foregone as a result of that decision. I.e. the decision to produce more milk involves switching resources from for instance beef and cereal production and therefore sacrificing beef and cereal output.

€ for set-aside), and e.g. 3.6 bn € for beef and 2.3 bn€ for olive oil. Linked to their original purpose, these direct payments have been coupled to the production of the respective commodity whose price support has been reduced. This has led to the situation that for the production of different crops and meats varying levels of direct payments are paid such that production decisions are influenced. As they lead to allocational inefficiencies and were still trade distorting, direct payments have been reformed in the 2003 CAP reform to become more decoupled from production. Full decoupling could initiate welfare gains of about 10bn € annually (CONFORTI ET AL. 2002). The 2003 reform has also introduced reductions of direct payments for the largest farmers.

### The Drawbacks of Coupled Direct Payments

Coupled direct payments have several economic and distributional shortcomings (see e.g. BEARD AND SWINBANK, 2001):

- First, they mainly capitalise in higher input prices (basically land) which significantly reduces the net gain for the farmers. Only around 50% of EU direct payments reach the farmers' pockets in net terms (see table 8 for a disaggregation per country). Besides this distributional effect,
- They lead to inefficiencies in the sector as they still influence production decisions by giving incentives to produce what is supported rather than what farmers and regions can do best. This reduces the value added produced by the sector (see box 3 for an illustration).
- Thirdly, with a view to enlargement, direct payments could hamper the needed restructuring process of the sector and keep the productivity of the sector below its potential.
- Finally, coupled direct payments might come under pressure in WTO negotiations for being coupled to production and thus influencing supply. The 'Peace Clause' agreement, which has expired end of 2003, had temporarily accepted coupled direct payments although they have an impact on production decisions and consequently on supply.

**Table 8: Share of rented land and transfer efficiency of coupled area payments**

	Share of rented land in % 2001 (*2000) FADN data and (99-00 Eurostat)	Transfer efficiency of area payments <sup>1</sup> (%)
Belgi(qu)e	75 (67)	24.1
Danmark	25 (25)	69.6
Deutschland	*69 (63)	30.0
Elláda	*37 (28)	59.2
España	33 (27)	62.3
France	*81 (63)	18.9
Ireland	18 (19)	75.9
Italia	38 (23)	58.0
Luxembourg	49 (53)	47.7
Nederland	*39 (28)	56.8
Österreich	31 (21)	64.4
Portugal	30 (23)	65.0
Suomi/Finland	33 (31)	62.5
Sverige	48 (46)	48.5
UK	*39 (34)	56.8
<b>EU-15</b>	<b>*50 (41)</b>	<b>47.0</b>

<sup>1</sup> Transfer efficiency gives an indication of how much of a transfer measure is in net-terms benefiting the farmer. It is calculated in adjusting detailed OECD estimates by varying rented land ratios. As since 2001 the rented area likely increased the transfer efficiency is probably less than indicated. Upward biased land prices paid by farmers buying land in the past years are not taken into account. It would further reduce the figures on transfer efficiency above.

Sources: own calculations, OECD, FADN data and EUROSTAT (Farm Structural Survey).

### **The advantages of decoupling**

The 2003 CAP reform included several positive steps towards reducing distortions in the agricultural sector and towards more efficiency. A major one has been the decoupling of direct payments into a decoupled single farm payment, which no longer interferes in the production decisions of farmers who now can mainly produce whatever is most suitable to them. Compensatory payments of newly reformed sectors should also be mainly included in the decoupled single farm payment. Allocational efficiency in the sector will thus improve following the reform and misallocations as illustrated in the hypothetical example in annex 6 would be reduced.

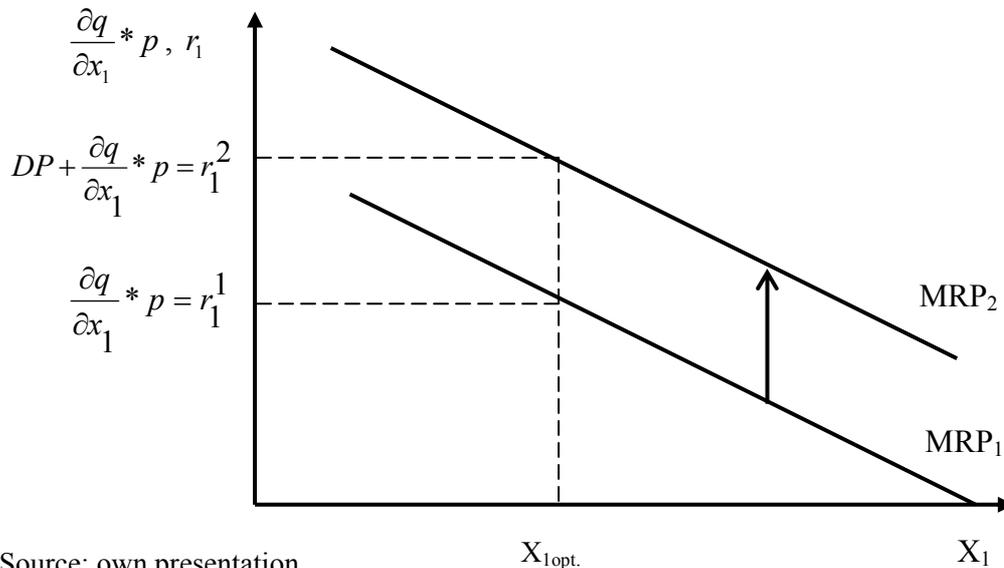
Most direct payments linked to production will, however, not be fully decoupled. The 2003 reform has allowed Member States to opt for maintaining part of the direct payments coupled to the respective production. Although this is not advisable from an economic point of view (see e.g. WISSENSCHAFTLICHER BEIRAT, 2003) as production decisions are still affected, some Member States use this option. Thus, some part of the formerly coupled direct payment will often remain coupled for at least some years as governments want to avoid sudden shifts in production. Thus, in the short run, improvements in allocational efficiency will be limited. In the medium term the degree of decoupling might, however, increase as it is beneficial for the sector (higher allocational efficiency and higher income).

Ideally, the new single farm payment should have been directly linked to the targeted beneficiary – the farm holder. The latter would receive full freedom to produce including the option of no longer producing at all. As at least some farmers would choose the latter option, needed structural changes in the sectors would be supported without any social disruptions as all farmers giving up do so for their own benefit (they continue to receive the payment). For the farmers remaining in production expanding production would become cheaper as the upward bias into land prices would fall. However, in the 2003 CAP reform the link to agricultural land has been maintained. The single farm payment will only be paid if the farm holder continues to keep his original amount of land (owned and rented) in agricultural condition. If he sells (or stops renting) parts of his land he will receive less (pro rata) single farm payments. This link keeps one of the main inefficiencies of direct payments in place – they capitalise in the value of land. As outlined in box 4, the determination of the price of land – as a factor of production – will not only account for the marginal revenue product of the land in agricultural use, but for the magnitude of the single farm payment attached to it. Thus also with the single farm payment the main beneficiary will be the owner of the land. As long as there is some competition for the land, all farmers renting land will have to transfer at least part of their transfer payments to the landlord on top of the ‘market value’ of the land. Similarly, all farmers buying land will have to pay the net present value of future transfers on top of the ‘market value’. Thus, expanding the farm size will be more expensive than in a situation where the single farm payment would not be linked to the land.

BRÜMMER AND LOY (2001) have analysed in how far the theoretically expected capitalisation of coupled direct payments can be empirically observed. Their study, utilising 1986-98 data from Schleswig-Holstein (Germany), indicates that a complete capitalisation cannot be observed, but that the degree increases over time.

**Box 4: The impact on factor prices from area, headage or single farm payments**

**Figure B4: Input demand function and the effects of area payments**



Source: own presentation

The price for an input is basically defined by its marginal productivity ( $\partial q / \partial x$ ) times the price  $p$  of the output  $q$ . Therefore, the demand curve for inputs is also called the marginal revenue product curve (MRP). In Figure B4  $MRP_1$  depicts the initial situation, where the optimal demand corresponds to the factor price  $r_1^1$ . Area payments lead to an increase of the  $MRP_1$  to  $MRP_2$  as the revenue from using land is increased by the amount of direct payment (DP). As for land the supply is almost fully inelastic the direct payment will with a constant demand just lead to an increase in the price of land (from  $r_1^1$  to  $r_1^2$ ). The prices of calves follow a similar change due to headage premiums. However, as the supply of calves is more elastic than the supply of land and the demand for calves can increase, the headage premium will not fully be passed over to increasing prices for calves.

Following the 2003 CAP reform area and headage premia have principally been decoupled from production. However, as the new single farm payment is linked to the use of land, it is no longer linked to production, but coupled to land. The effect on the price of land as a factor of production thus remains as illustrated above.

**The administrative costs of agricultural policies**

The administrative costs of agricultural policies are significant. This holds in particular for direct payments as farmers individually apply for them annually. They have to demonstrate how much of each crop and/or how many cattle or sheep they are producing. Based on this information the annual payments to farmers are calculated by regional administrations. The introduction of decoupled payments following the 2003 reform is a significant step towards simplification as a differentiation by numerous types of crops is no longer necessary. Principally, farmers will receive a fixed rate per hectare and the types of production and the number of animals are no longer relevant leading to lower administration and control. On the other hand, cross compliance has been introduced, which requires certain production conditions from the farmer (e.g. in terms of environment and animal welfare) to remain eligible for direct payments. The control of the latter will make it difficult for the Member States to reduce their administrative personnel to administer the CAP and additional national support programmes.

A study on the cost of agricultural administration in 131 German regions showed interesting results (MANN, 2001). Agriculture was defined narrowly in including only those

administrative and supportive duties which are directly linked to agricultural production. Education and extension services, rural development, consumer protection and agricultural research are items which were not included in the calculations. According to the survey the total administrative costs to implement agricultural policies in Germany added up to 695 mn € in 1999 of which less than 2% were attributed to the EU Commission, around 12% to the federal government, 29% to the Länder level and 57% to the local authorities. The total amount equals to 7% of net value added in German agriculture in that year. Depending on the organisational efficiency, the farm structure and additional agricultural programmes outside the CAP the costs varied between 22€ and 94€ per hectare. Even if the results give only a broad indication of the costs and even if other Member States may be more efficient in their administration (e.g. due to larger farm structures and less national programmes), the magnitude of the costs might likely reach 4-7% of NVA in the EU as a whole. This relatively high burden in particular at the regional level should lead to more simplification efforts of agricultural policies. Supporting structural adjustment in the sector could also be a means to reduce the administrative costs. Mann's calculations clearly give evidence that administrative costs are significantly lower in those regions with larger farms.

## **6. Conclusions**

The analysis of the main measures of the Common Agricultural Policy has shown major inefficiencies. Some of these will be alleviated as several reforms still have to be implemented. Support for butter and skimmed milk powder prices will be reduced in the coming years, direct payments will be decoupled from production (at least partly), the cotton, olive oil and tobacco sector will see a partial decoupling of support and for the sugar sector the Commission has proposed significant reductions in price support. In particular price support policies, but also land set-aside obligations, quota restrictions and coupled forms of direct payments, lead to inefficiencies within the agricultural sector and to high economic costs for the society as a whole. The measures are designed in such a way that farmers do not fully benefit from about 100 bn € of annual transfers (EU-15) stemming from taxpayers and consumers. The support level to the sector is about as high as the net value added it produces, while the (labour-) productivity is significantly lower than for instance in the US, Australia or New Zealand. Productivity is relatively low in particular in those EU Member States where structural adjustments are the least advanced. This holds for the ten new Member States, but also for Portugal, Ireland and Greece, and for Finland, Austria and Sweden since enlargement in 1995.

In introducing the decoupling of direct payments from production the 2003 CAP reform has implied a significant improvement with regard to allocational efficiency within the sector. Policy induced distortions in factor allocation will thus decrease. However, there are strong reasons to continue the reform efforts of the CAP. First of all, the overall support level for agriculture maintained at a high level, implies a burden for the rest of the economy and thus negatively affects overall economic growth. Secondly, more than 50% of support for the agricultural sector still stems from price support and thus from one of the least efficient forms of policy interventions with respect to targeting the beneficiaries (farmers) and with respect to overall economic costs. Thirdly, and linked to price support, restrictions in productions through set aside obligations and quotas on production significantly reduce the efficiency of agricultural production. Future reforms should take these current drawbacks into account to further raise sectoral productivity and to foster structural adjustments.

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## ANNEX

**Table A1: Percentage Producer Support Estimates for the EU**

Commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
<b>Common wheat</b>	32	54	45	50	52	40	30	32	46	52	42	41	37	41
<b>Durum wheat</b>	61	59	56	61	58	62	61	63	61	67	65	67	62	64
<b>Maize</b>	51	53	54	46	42	46	29	33	40	43	41	36	30	41
<b>Barley</b>	48	54	55	65	69	58	41	46	66	61	46	49	49	51
<b>Oats</b>	34	33	45	52	60	65	60	60	70	76	71	68	56	62
<b>Rice</b>	56	52	59	59	58	48	26	28	25	16	17	41	34	36
<b>Rapeseed</b>	68	52	63	58	50	49	48	42	40	38	45	43	33	33
<b>Soybean</b>	61	76	60	55	52	48	44	37	42	33	38	38	30	30
<b>Sunflower</b>	60	64	58	57	50	49	50	44	41	39	45	42	33	37
<b>Refined sugar</b>	45	55	63	56	47	59	49	51	56	62	53	49	57	63
<b>Milk</b>	62	59	59	59	57	54	51	50	57	51	42	42	49	51
<b>Beef</b>	54	63	53	47	48	53	59	67	67	67	65	72	74	77
<b>Sheep meat</b>	72	71	70	58	61	69	59	51	57	58	52	56	45	58
<b>Pig meat</b>	2	8	-3	12	12	14	16	17	17	33	26	22	21	24
<b>Poultry meat</b>	34	29	41	42	45	48	43	34	29	41	36	35	38	37
<b>Eggs</b>	6	7	10	7	-1	9	7	3	9	13	4	2	3	2
<b>Total (% PSE)</b>	<b>35</b>	<b>41</b>	<b>37</b>	<b>39</b>	<b>37</b>	<b>38</b>	<b>35</b>	<b>34</b>	<b>38</b>	<b>40</b>	<b>34</b>	<b>34</b>	<b>35</b>	<b>37</b>
<b>PSE (bn €)</b>	<b>88</b>	<b>104</b>	<b>93</b>	<b>94</b>	<b>92</b>	<b>103</b>	<b>98</b>	<b>97</b>	<b>106</b>	<b>108</b>	<b>97</b>	<b>99</b>	<b>101</b>	<b>108</b>
<b>of which: market price support (bn €)</b>	<b>70</b>	<b>83</b>	<b>71</b>	<b>65</b>	<b>60</b>	<b>64</b>	<b>58</b>	<b>56</b>	<b>67</b>	<b>70</b>	<b>57</b>	<b>55</b>	<b>58</b>	<b>62</b>
<b>US\$/€(ECU)</b>	1.21	1.18	1.25	1.17	1.21	1.37	1.30	1.13	1.11	1.07	0.92	0.90	0.94	1.13
<b>NVA (bn €)</b>				93	100	104	109	109	107	105	108	112	107	107
<b>Producer NAC</b>	<b>1.6</b>	<b>1.7</b>	<b>1.6</b>	<b>1.6</b>	<b>1.6</b>	<b>1.6</b>	<b>1.5</b>	<b>1.5</b>	<b>1.6</b>	<b>1.7</b>	<b>1.5</b>	<b>1.5</b>	<b>1.5</b>	<b>1.6</b>
<b>Total transfers from consumers (bn €)</b>	<b>70</b>	<b>81</b>	<b>68</b>	<b>63</b>	<b>61</b>	<b>60</b>	<b>51</b>	<b>52</b>	<b>65</b>	<b>69</b>	<b>55</b>	<b>52</b>	<b>56</b>	<b>60</b>
<b>Total transfers from taxpayers (bn €)</b>	<b>37</b>	<b>45</b>	<b>45</b>	<b>48</b>	<b>44</b>	<b>54</b>	<b>60</b>	<b>62</b>	<b>55</b>	<b>54</b>	<b>56</b>	<b>60</b>	<b>58</b>	<b>62</b>
<b>Total value of production (bn € at farm gate)</b>	<b>231</b>	<b>235</b>	<b>227</b>	<b>213</b>	<b>217</b>	<b>232</b>	<b>242</b>	<b>242</b>	<b>236</b>	<b>234</b>	<b>242</b>	<b>249</b>	<b>244</b>	<b>243</b>

Source: OECD (2004), EUROSTAT (2004), AMECO (2004) and own calculations.

**Table A2: Percentage Consumer Support Estimates<sup>1</sup> for the EU**

Commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Common wheat	-21	-34	-23	-23	-18	-7	0	0	-11	-13	-5	-2	0	-1
Durum wheat	-51	-52	-42	-24	0	0	0	0	-5	-5	0	0	0	0
Maize	-6	-9	-6	-7	-4	-7	-2	-3	-2	-3	-2	-2	0	-3
Barley	-11	-13	-12	-12	-12	-7	0	-2	-10	-7	0	0	0	-1
Oats	-5	-5	-11	-6	-5	-5	-4	-3	-6	-8	-7	-4	0	-1
Rice	-57	-56	-56	-58	-57	-47	-25	-23	-15	0	0	-29	-21	-23
Rapeseed	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Soybean	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sunflower	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potatoes	-13	-14	-12	-10	-12	-12	-8	-6	-8	-7	-4	-6	-5	-3
Refined sugar	-51	-63	-66	-62	-54	-53	-56	-56	-63	-69	-60	-51	-62	-68
Milk	-63	-60	-59	-57	-55	-51	-47	-47	-55	-50	-38	-38	-45	-48
Beef	-50	-61	-48	-39	-35	-41	-40	-54	-55	-55	-53	-58	-61	-63
Sheep meat	-61	-56	-53	-28	-35	-43	-31	-21	-28	-27	-20	-30	-24	-26
Pig meat	-7	-17	0	-15	-15	-13	-14	-11	-17	-36	-25	-20	-18	-21
Poultry meat	-50	-45	-54	-52	-53	-56	-44	-35	-34	-47	-37	-34	-35	-38
Eggs	-11	-11	-13	-9	0	-10	-5	-1	-10	-14	-3	0	0	0
<b>Total % CSE</b>	<b>-35</b>	<b>-39</b>	<b>-33</b>	<b>-33</b>	<b>-30</b>	<b>-29</b>	<b>-25</b>	<b>-26</b>	<b>-32</b>	<b>-35</b>	<b>-27</b>	<b>-25</b>	<b>-28</b>	<b>-30</b>
<b>Total CSE (bn €)</b>	<b>-59</b>	<b>-68</b>	<b>-57</b>	<b>-53</b>	<b>-52</b>	<b>-53</b>	<b>-47</b>	<b>-46</b>	<b>-57</b>	<b>-61</b>	<b>-49</b>	<b>-48</b>	<b>-52</b>	<b>-55</b>
<b>Consumer NAC<sup>2</sup></b>	<b>1.54</b>	<b>1.63</b>	<b>1.50</b>	<b>1.49</b>	<b>1.43</b>	<b>1.40</b>	<b>1.34</b>	<b>1.34</b>	<b>1.47</b>	<b>1.54</b>	<b>1.37</b>	<b>1.33</b>	<b>1.39</b>	<b>1.43</b>
<b>Total transfers from consumers (bn €)</b>	<b>70</b>	<b>81</b>	<b>68</b>	<b>63</b>	<b>61</b>	<b>60</b>	<b>51</b>	<b>52</b>	<b>65</b>	<b>69</b>	<b>55</b>	<b>52</b>	<b>56</b>	<b>60</b>
<b>Total transfers from taxpayers (bn €)</b>	<b>37</b>	<b>45</b>	<b>45</b>	<b>48</b>	<b>44</b>	<b>54</b>	<b>60</b>	<b>62</b>	<b>55</b>	<b>54</b>	<b>56</b>	<b>60</b>	<b>58</b>	<b>62</b>
<b>PSE (bn €)</b>	<b>88</b>	<b>104</b>	<b>93</b>	<b>94</b>	<b>92</b>	<b>103</b>	<b>98</b>	<b>97</b>	<b>106</b>	<b>108</b>	<b>97</b>	<b>99</b>	<b>101</b>	<b>108</b>
<b>Transfer per capita<sup>3</sup> in € as ...consumer</b>	191	221	185	170	164	162	137	138	173	183	145	139	148	159
<b>...taxpayer</b>	101	124	123	129	120	145	162	166	146	143	148	160	153	164
<b>...total (net of budget revenues)</b>	286	343	305	298	282	306	298	303	318	325	292	297	300	320
<b>TSE<sup>4</sup> (bn €)</b>	<b>105</b>	<b>125</b>	<b>112</b>	<b>110</b>	<b>105</b>	<b>114</b>	<b>111</b>	<b>113</b>	<b>119</b>	<b>122</b>	<b>110</b>	<b>112</b>	<b>114</b>	<b>122</b>
<b>%TSE</b>	2.2	2.2	1.9	1.8	1.6	1.7	1.6	1.6	1.6	1.5	1.3	1.3	1.2	1.3
<b>TSE per AWU</b>	na	14754	13836	14299	14091	15795	15842	16577	17667	18931	17803	18489	18943	20767

<sup>1</sup> Negative consumer support estimates indicate the share of the final price paid by the consumers which originate in prices higher than international ones. I.e. on aggregate of the products analysed 30% of consumer expenditures in 2003 were for farm support implying a tax rate of 42.6%.

<sup>2</sup> The nominal assistance coefficient (NAC) measures the consumer price differential or the ratio between the price paid by the consumers (at farm gate) and the border price.

<sup>3</sup> yearly average population.

<sup>4</sup> The Total Support Estimate is the annual monetary value of all gross transfers from taxpayers and consumers arising from policy measures that support agriculture, net of associated budgetary receipts, regardless of their objectives and impacts on farm production and income, or consumption of farm products. The %TSE measures the overall transfers from agricultural policy as percentage of GDP.

Sources: OECD (2004), EUROSTAT (2004) and own calculations.

### **Annex 3: The Functioning of the Futures Market**

In this section the theory of futures contracts and trading is described and exemplified. The basic idea is explained, the hedging risks are outlined and a comparison to forward contracts is given.

#### **Two Services of Futures Exchanges**

A commodity futures exchange offers two main services to the agricultural sector. On the one hand the current and easily accessible futures prices serve as a forecast for spot market prices in the future. They do so in a quite advanced manner, as they incorporate all available supply and demand information relevant for the price formation until the expiration of the futures contract (e.g. crop forecasts, weather conditions, stocks, import demands, etc.). This increases the transparency on the market and reduces the observable information advantage of traders against producers. Hence, the markets' efficiency increases. The second service of the exchanges is that they allow buyers and sellers of commodities to fix the price in advance of activities yet to come. This reduces the risk of unexpected price movements and, hence, increases the confidence of planning<sup>20</sup>.

#### **The Futures Contract**

A futures contract is a legally binding agreement, made through a futures exchange, to buy or sell a specified amount of commodity<sup>21</sup> at a particular quality on a given day in the future. Their basic feature is that they are standardised in every sense except the price. Hence, the amount of commodity being bought or sold, the quality of the product and the time and place of delivery are fixed determinants and the one and only term of negotiation is the price. This standardisation implies low transaction costs and thus makes futures attractive on the one hand for buyers and sellers of the underlying commodity to protect themselves from unpredicted price fluctuations and on the other hand for investors wanting to profit from it. The more homogenous a commodity is in quality and the higher the quantity of real commodities traded, the more likely futures contracts exist or could be developed. Within agriculture there are many commodities for which futures contracts are available e.g. rapeseed, wheat, maize, soybeans, or hogs.

#### **Hedging Against Price Risks**

A seller (buyer) of a commodity hedging on the market receives (pays) a net price for the commodity based on the actual spot price at the time of transaction ( $P_{t+1}^s$ ) plus the net result from selling (buying) a futures contract at time  $t$  and its liquidation by buying (selling) the contract back at the time of the spot market transaction ( $P_t^f - P_{t+1}^f$ ). I.e. in principle the net price is  $P_{t+1}^{net} = P_{t+1}^s + (P_t^f - P_{t+1}^f)$ . The hedging is based on the assumption that futures and spot market prices run parallel. In that case as the simple formula shows a rise or a fall in prices between  $t$  and  $t+1$  has no effect on the net price, as an unfavourable development in the one market is equalised by a favourable position in the other. Two simple examples will try to picture this basic idea of using futures contracts for hedging purposes. For simplicity the hedging costs and the risks involved are not incorporated here, but will be described later on.

First, assume a food processor, e.g. a miller, is planning to buy 2,000 tonnes of wheat during the next months to cover its needs through spring next year. Currently wheat is

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<sup>20</sup> TOMEK AND PETERSON (2000, p. 8 citing WISNER ET AL., 1998) add that many large farmers are risk loving and do not hedge primarily as a risk management tool, but for exploiting the theory that the futures prices some months in advance are by tendency higher compared to the actual cash prices at settlement, as the distribution of prices is skewed to the top (based on the positive probability of a drought or other yield-reducing events. ZULAUF AND IRWIN (1997) could not find statistical evidence for this hypothesis.

<sup>21</sup> There are other futures available, like on stock indices.

quoted for 100€/t, but the processor is concerned that the price will rise by the time he is ready to purchase the commodity. Hence, he buys 40 January wheat contracts at MATIF (Marché à Terme International de France) in Paris. The contract size is 50 tonnes. Now we assume two outcomes of the hedge, which are both summarised in table 1.

**Table 1: A Processors' Long Hedge Example**

	Spot Market	Futures Market	
October	Plan to buy 2,000 tonnes of wheat on the spot market @ 100€/t	BUY 40 January wheat contracts at MATIF@ 100€/t	
January	Purchase of 2,000 tonnes of wheat @ a) 120€/t and b) 90€/t	SELL 40 January wheat contracts at MATIF @ a) 120€/t and b) 90€/t	
Results	Spot purchase price Net futures position Net purchase price	a) price +20% 120€/t 20€/t 100€/t	b) price -10% 90€/t -10€/t 100€/t

Source: own fictitious example

In the first scenario the processor was right and the price increased by 20% and the other scenario takes a further price drop of 10% as an example. The hedge leads in both cases to the same net result. If the processor had only made a transaction on the spot market in January he would have paid 120€/t or 90€/t respectively. As by the time of the futures contract's maturity (end of contract when commodity has to be delivered or purchased) the prices on the futures market and on the spot market converge, the price for the futures contracts changes correspondingly. Hence, in the case of a price increase to 120€/t in January he makes a profit of 20€/t in selling the futures position (closing out or liquidation of an open position), which was initially bought for 100€/t. Therefore, in net terms the purchase price is reduced from 120€/t to 100€/t (see table 1).

In the event of a price decrease, however, the hedger realises a loss of 10€/t with the futures position. The spot price and the futures price both stay at 90€/t in January and, hence, in net terms the processor has to add to his purchasing price of 90€/t the 10€/t loss realised with his futures contract initially bought at 100€/t. It shows that the net price is actually locked at 100€/t, no matter if the price development in the meantime becomes unfavourable or not. In the example a full hedge was assumed, i.e. the whole quantity of commodity to be traded on the spot market was hedged on the futures exchange.

This was a so called long hedge example. First, the contract was bought and sold again afterwards. A producer of a commodity who is actively hedging on the futures market will be a short hedger, as for his engagement the first trade is the SELLING of a futures contract, which will later be BOUGHT back. Let us assume a wheat producer in spring who plans to sell his produce (200t) after harvest for a certain price (table 2).

**Table 2: A Producers' Short Hedge Example**

	Spot Market	Futures Market	
May	Plan to sell 200 tonnes of wheat on the spot market @ 100€/t	SELL 4 October wheat contracts at MATIF@ 100€/t	
October	Sell 200 tonnes of wheat @ a) 120€/t and b) 90€/t	BUY 4 October wheat contracts at MATIF @ a) 120€/t and b) 90€/t	
Results	Cash selling price Net futures position Net selling price	a) price +20% 120€/t -20€/t 100€/t	b) price -10% 90€/t 10€/t 100€/t

Source: own fictitious example

With an analogue procedure he can lock in the price already before harvesting. This acceptable price may again be 100€/t in the example. In the event of a price increase to 120€/t the producer will receive this price on the spot market, but with the futures position a loss of 20€/t is realised as the contracts were initially sold at a lower price (100€/t) and now liquidated (bought) at the higher price of 120€/t. In net terms the price received is, hence, 100€/t. In the contrary, the short hedger makes a profit with the futures position in case of a price fall. The lower price on the spot market (90€/t) is in net terms improved by the profit on the futures market (10€/t). Again the price was locked at a certain level (100€/t) independent of future price movements.

It should be pointed out that theoretically, assuming a very long time span, the average net price a producer receives (a processor pays) with hedging is equal to one without hedging except for the amount of hedging costs which lower (increase) the net price for the hedger.

### **Risks in Futures Trading**

The above examples abstracted from the costs of hedging and from certain risks involved in its use. Besides the fees and commission for the broker and the exchange an additional cost arises for having to pay a deposit. However, this obligatory deposit assures the contracts safety. The deposit and some issues of hedging risks are discussed next.

#### **Practically No Risk of Contract Default**

For all trades in futures the official trading partner for each engagement in futures is the futures exchange. They ensure that contract defaults will practically not happen. The reason they can do so is in asking all participants to pay an initial margin (deposit) on each contract ordered. The amount is decided by the exchange and usually ranges around 3 to 5%, but is higher in volatile markets. If the price development of one's futures position becomes very unfavourable an additional margin call leads to an increase of the deposit. The deposit is kept high enough to make it unfavourable for the contract holders to break the contract, as in that case the deposit is lost.

This ensures the contracts' safety. A further question regards why the cash and the futures markets do converge more or less, which is essential for the hedging purpose. The foundation is that the contracts not necessarily have to be liquidated, but a holder of a futures position can always opt for the delivery of the commodity (although this is rarely done). For this reason at the time when the futures contract is about to expire (maturity) the cash and futures prices will converge. Convergence is reached in efficient markets, i.e. arbitrage transactions will reduce any deviations. As this does not always perfectly work for several reasons the hedger exchanges the price risk against this new (but significantly smaller) risk, called basis risk and several other less important hedging risks.

Ideally, there is no hedging risk in exchange for the removal of the price risk on the underlying spot market and the hedger realises at time  $t+1$  the futures price at time  $t$  minus the transaction costs of hedging. In reality the net price after hedging differs slightly in one or the other direction. The hedging risk is caused by basis risk, lumpiness, market depth risk, and margin risk (PENNINGS, 1998 or SIMONS, 1998). The main risk of these is the basis risk; therefore the others will only be mentioned (for an overview see PENNINGS, 1998).

#### **Basis Risk**

By definition the basis is the difference between the price of a commodity on the spot market and the price of the corresponding futures contract. For the hedging success a constant positive or negative basis is without influence. The basis risk is due to the variation of the basis. This relates to the distance between the cash market and the futures' delivery location, time lags between settlement days and cash market operations and to the

quality of the commodity. Regarding quality, a producer who hedges his harvest might unexpectedly have a different quality than described in the contract. As the quality of the futures contracts is fixed, this loss in quality of the commodity (like for potatoes after a rainy or very dry summer) can lead to net losses for the hedger. High quality might become rare on the market, while poor quality (like his) is sufficiently available, which could lead to an increasing divergence in these prices. Consequently, the net hedge result becomes worse. The quality risk gains importance also for cross hedging exercises, i.e. for hedging barley prices with a wheat contract. Except for the quality aspect it holds that with an increasing intensity of market integration the basis risk decreases and hedging becomes more beneficial. The case study will come back to the basis risk.

### **Other Minor Risks**

Another risk is the margin risk. For instance at times of a falling price development the futures position of the long hedger (e.g. a processor) becomes unfavourable (see table 1). The clearing bank asks in these cases for an increase in the deposit (margin call). As stated above, this is necessary to guarantee that all participants fulfil their obligations. However, the number and magnitude of margin calls are unknown (as they depend on the price movements) and hence, the hedger does not know how much potential cash he would have to set aside for that. A falling price development which is unfavourable for the long hedger's futures position is, of course, favourable for the short hedger's futures position. Principally, the short hedger could in this case of a falling price trend reduce his deposit. If one holds positions of different commodities the overall deposit is important, as the positions' depository obligations can be counterbalanced.

A further rare risk is the roll over risk. This occurs for commodities, where the futures contracts offered do not cover the anticipated time span of the hedger. It could be that the hedger wishes for some reason to hedge for a longer time span than the latest available future could cover (stock holders). This would necessitate switching from one contract to another.

Market depth risk prevails on futures markets where the traded volume is very low. Here, single transactions might have a relatively large influence on the futures price. Practically the basis risk increases and/or the hedger might have problems to offset his futures position.

Finally, one faces possible lumpiness, which relates to the standardised quantities of futures contracts. Therefore, the quantity of the commodity can usually only be over or under hedged, as it has to be a multiple of the futures contracts' specified quantity (e.g. 50 tonnes for wheat). This problem diminishes when the total volume of the commodity to be hedged increases.

### **Comparison with Forward Contracts**

A forward contract is achieved by two parties who agree on the future transaction of a specified commodity. It differs from futures contracts in two ways. First, the participants are contracting directly with each other, while for futures contracts the exchange is always one contract partner. Second, the terms of the contracts are negotiated by the contract partners, while on the futures market the terms are fixed by the exchange. The advantages of forward contracts are a) the flexibility in the contract terms (date and place of delivery, quality, etc), which can be customised tailored to specific needs, b) the low learning costs for this kind of price risk reduction, and c) the non existing basis and liquidity risks (although they are relatively low). On the other hand it also entails higher transaction costs for the longer periods of searching for partners and of negotiation, and a higher risk of contract defaults. Indeed, it happens frequently that one of the partners breaks out of the

contract in cases of unfavourable price developments. Any penalties are hard to enforce for the counterpart. As the uncertainty is taken into account for example by the grain trader, his price offered to the producer in the forward contract is slightly lower compared to a situation without contract default risk like on the futures market.

Hence, the two main advantages of futures are the reduced transaction costs of finding a partner and the institutionalised safety of contract liability as the party facing an unfavourable price development regularly has to increase his deposit, which makes it just unfavourable for him to break the contract and lose the deposit. Furthermore, the net-price via the futures market is by tendency better due to the lower transaction costs. Hence, the use of futures contract is a favourable option for medium sized and larger users, who can spread their initial learning costs on a larger volume traded and who have quantities for sale which better suit the contract sizes for futures. Practically, small producers will prefer forward contracts, which might be based on futures prices and the grain trader for example may then go to the futures markets to hedge the risk. Table 3 summarises the comparison of forward and futures contracts and table 4 gives an overview of trade volumes.

**Table 3: Comparison of Forward and Futures Contracts**

Characteristics	Forward contract	Futures contract
Competitiveness of price	Depends on margin taken by counterpart	Yes
Basis risk	No	Yes
Default risk	Some	No
Ease of recontracting or offset	Depends	Yes
Physical delivery	Yes	Seldom
Liquidity risk (margin calls)	No	Yes
Flexibility in the terms of the contract	Some	No
Time spent on negotiation	Some at least	No
Learning costs for first trade	Low	High

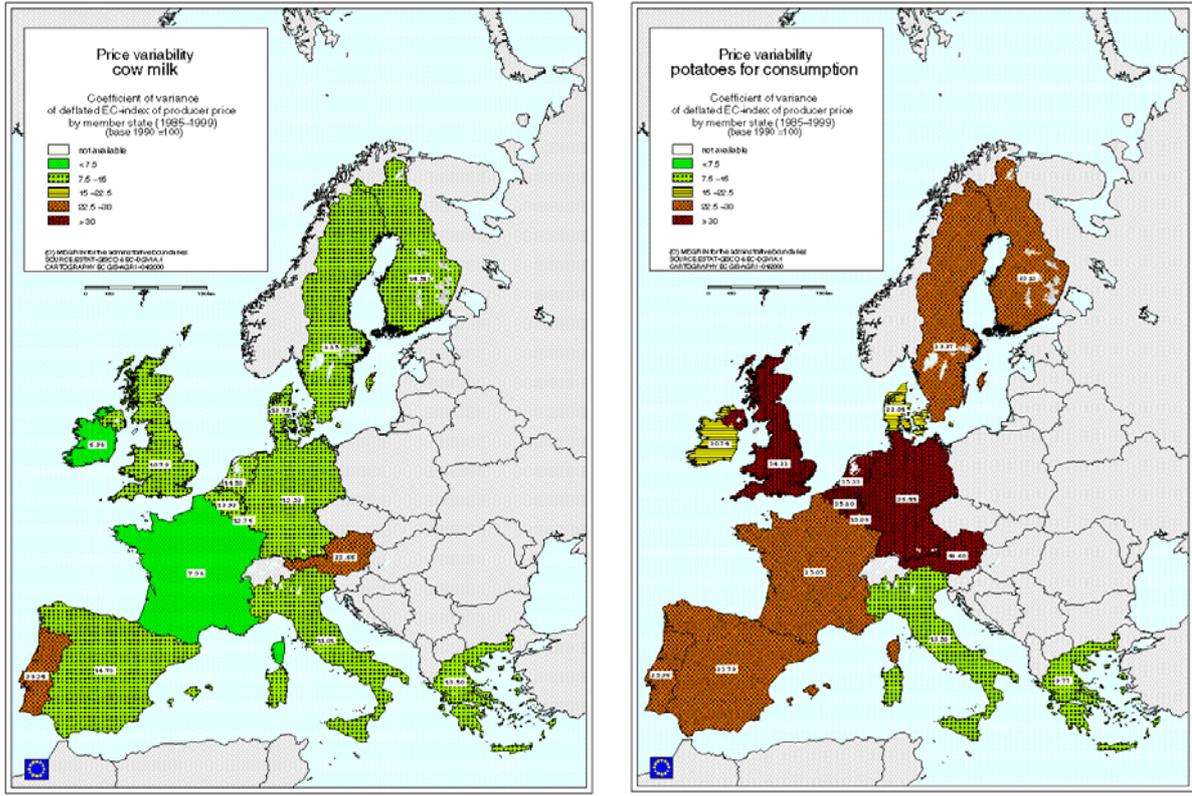
Source: HARWOOD ET AL. (1999) and own amendments.

**Table 4: Volume traded relative to production in selective countries 1990-2002 (in %)**

Exchange	country	Commodity	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CBOT	USA	Corn	720	726	546	904	574	1021	1063	922	809	833	867	880	
CBOT	USA	Soybeans	2674	2269	2054	3115	2137	2440	2990	2704	2268	2361	2289	2102	
CBOT	USA	Wheat	527	795	709	630	780	1135	1182	1019	1115	1427	1435	1738	
KCBT	USA	Wheat	208	357	272	281	324	357	402	390	394	504	544	602	
SFE	Australia	Wheat							1.1	1.3	1.6	1.4	1.4	0.8	
LIFFE	UK	Wheat		23	45	49	63	71	72	86	64	67	52	83	
MATIF	France	Wheat								2.0	5.2	5.8	4.4	9.1	
WTB	Germany	Wheat										2.0	0.5	0.5	0.6
LIFFE	UK	Barley								20	17	10	5	8	
WCE	Canada	Rapeseed	427	386	431	354	323	334	530	434	408	467	504	913	956
WTB	Germany	Rapeseed										1.3	5.5	0.3	0.1
MATIF	France	Rapeseed						95	105	109	139	156	167	236	
AEX	Netherlands	Potatoes	40	28	28	50	81	56	23	24	35	21	19	22	
LIFFE	UK	Potatoes								7.2	7.7	4.5	4.5	3.9	
WTB	Germany	Potatoes									1.2	0.8	0.8	1.8	0.9
AEX	Netherlands	Hogs	26	36	30	26	25	19	31	42	27	25	20	22	
WTB	Germany	Hog									1.1	3.5	4.4	8.3	6.3

Sources: own calculations; [CRONOS database](#); [PSDatabase](#); [Chicago Board of Trade \(CBOT\)](#); [Kansas City Board of Trade \(KCBT\)](#); [Sydney Futures Exchange \(SFE\)](#); [London International Financial Futures & Options Exchange \(LIFFE\)](#); [Marche a Terme International de France \(MATIF\)](#); [Warenterminbörse Hannover \(WTB\)](#); [Winnipeg Commodity Exchange \(WGE\)](#); [Amsterdam Exchanges \(AEX\)](#).

**Figure A4: Price Volatilities of Milk and Potatoes**



Source: DG Agriculture

## **Annex 5: Impact of Quota Trading on Regional Patterns of Production (case studies)**

Three studies tackled the regional effects of quota trading in the UK (COLMAN ET AL., 1998), France (BEYNET, 2000), and Germany (KLEINHANß ET AL., 2001). For the UK COLMAN ET AL. developed regionally different cost functions and different levels of opportunity costs and included regional differences of output prices to model several policy scenarios by considering 643 sample farms. Among others a free trade of quotas is simulated. As the model results are to be viewed in the long-run COLMAN ET AL. introduced restrictions on total adjustments, i.e. they allowed for instance only 20% of the adjustment to a new optimum which could be seen as the reaction in the short run. A full tradability with a maximum of adjustment of 20% leads to a shift to larger herd sizes (above 70) and to an increase of total output in LFA. The average milk yield of the remaining producers was more than 20 % higher compared to the ones leaving the sector. These results confirm what was outlined above, i.e. the shift to the more efficient (higher yields) and to the ones with lower opportunity costs (LFA). The results allowing a 40% adjustment are simply an acceleration of the former results. The LFA are gaining in total output, the average yield of the remaining producers increase even further and the shift from small to larger herd sizes increases. This goes along with a larger number of exiting farmers from all size categories even in the group of above 150 cows. The largest relative net increase is in the size group of 100-149 and the strongest drop (here 100%) is in the group below 10, which might stem from exiting from production or from growing into another size class. The strongest increases in output in the simulations are found for the North and North East of England, Scotland and Northern Ireland. England as a whole would suffer a reduction in output. In the South and South West of England with higher prices and costs the output increase is moderate. Wales and the North West of England suffer output falls of a few percentage points and the East of England suffers severe losses in output in relative terms. In absolute terms this region is not a strong milk producer and the number of producers fell by 45% between 1985 and 1997. Hence, full tradability only accelerates the given trend.

The short term regional impact of the introduction of quota tradability in France has been investigated by BEYNET (2000). The methodology uses a short term quadratic cost function to derive marginal cost and a stochastic frontier production function which allows for the estimation of potential efficiency gains. Data are from the 1996 Rica sample and include farms with milk specialisation and with mixed (beef/milk) production.

The introduction of quota tradability is first investigated under a no policy change scenario. Due to a high level of potential efficiency gains (median value: 23%) especially in small farms, likely to result from a rigid quota allocation, French farms would seem able to produce at a price level 30% lower<sup>22</sup>. Tradability is shown to have an impact on regional productions which does not mean similar effects for all farms within a region since the latter display wide differences. The overall results in terms of welfare are positive for all regions, gains being much higher for regions that sell quotas than for the buyers<sup>23</sup>. The quota transaction patterns leading to such results are primarily determined by the level of marginal cost and the average price paid for milk<sup>24</sup>. Thus, main regional buyers are Nord/Pas de Calais and eastern France where milk farms have the lowest marginal costs

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<sup>22</sup> From 2.07 FF to 1.45 FF/litre in 1996.

<sup>23</sup> Welfare gains are proportional to the (square) quantity traded. Quota sales are on average more important per farm than acquisitions and this is reflected at the regional level.

<sup>24</sup> The impact of potential efficiency gains is more difficult to identify at regional level. The median level ranges from 25% (Rhône-Alpes) to 40% (Picardie).

while the major producers e.g. Bretagne, Pays de la Loire, Basse-Normandie, whose marginal costs are close to the national average buy quotas in relatively moderate proportions (+ 5.5%). Centre and south-west regions are quota sellers. Evolutions in mountainous regions are diverse. Limousin and Rhône-Alpes sell quotas while the production remains stable in Auvergne and increases very significantly in Franche-Comté as a result of quota acquisition. The performance of the latter is explained by relatively high sale prices for milk due to high value-added in dairy products while a relatively low marginal cost is a predominant feature in Auvergne. Transaction patterns are not influenced by farm size. Nevertheless, farms that sell quotas are slightly more intensive.

Quota tradability is also simulated under a policy reform scenario assuming a 30% decrease in intervention prices fully passed on to market milk prices, partially compensated (50%) through direct payments. Direct payments are partly allocated under conditions similar to those proposed by the Commission in Agenda 2000 and partly granted to the most extensive farms<sup>25</sup> through a “modulation” envelope. Such reform does not lead to significant changes in quota transactions nor in the allocation of regional milk production. However, the introduction of an aid solely benefiting the most extensive farms which is limited to 235 mn € in the simulation can have a significant impact on the situation of mountainous regions. Auvergne buys quotas and increases its production by 16%. Other regions (Limousin, Rhône-Alpes, Midi-Pyrénées) are still quota sellers but to a lesser extent. Such aid is only a second best solution, the first best being the development of high value-added dairy products, and cannot ensure long term persistence of production in regions which have no comparative advantage in milk production. It might, however, be used as a transitional instrument to help mountainous regions to progressively improve their competitiveness.

A study by KLEINHANß ET AL. (2001) used data from around 4800 German farms for the year 1997/98 from the BMVEL – farm accounts data network. They used the BEMO model to model different scenarios of phasing out the milk quota system. Fixed costs of production are not taken into account. The model therefore, shows only short term adjustments. The model utilised, however, the observed adjustments of more than 3600 typical farms between 1995/96 and 1999/00 and could therefore be seen as less short term than the AROPAJ model. Quota trading is modelled as renting of quota and not as selling. In modelling the final phase of AGENDA 2000 quota trading within Germany would increase the income of milk producers by more than 190 Mn € or 3.4% of current sectoral income. This could be seen as a lower end figure as only short term adjustments are modelled. Roughly two thirds of the gains would go to expanding farms renting additional quota while one third of the income growth would go to farms reducing their milk production and renting out part or their entire quota. Like Figure 5 would suggest the milk quota would move to the old Länder and hence, the largest income gain in the old Länder is with the expanding farms while the largest income gain in the New Länder is with the farms reducing their milk production. Roughly 10% of total quota would be traded according to their model and farms with 25 to 100 cows would be the ones with the largest growth in production (and income). Around 10% of the farms in the sample would give up milk production and around 15% would reduce their production, while around 25% of the farms would expand their production by up to 10%. Some of the latter would even invest in new stables. It follows that around 50 % of the farms would participate in the gainful trading of quotas and could improve their income situation. An interesting comparison was done with a scenario of phasing out the quota system. Farms which rent out the quota

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<sup>25</sup> The most extensive farms: those whose LU/ha is 50% below that of the most intensive ones. In the simulation the global quota is also increased by 4% to the benefit of all farms.

under the trading scenario would also reduce their production under the phasing out scenario with strong price cuts. The farms which expand their production under the trading scenario would also do so without the quota system as long as the price drops by less than 22%. This finding supports the argument that quota tradability just speeds up the adjustment process which would take place in the medium term anyway.

JAYET (2001) estimated the effects of quota tradability on a European level. Utilising a linear programming approach the results are to be viewed as short term effects. This is enhanced by the fact that the model could not successfully take account of the option of a full halt in production. The total income effect would reach roughly 740 Mn € for the EU as a whole. Including dynamic adjustment processes these gains would be significantly higher. The largest gainers in the study are found to be Spain (168 Mn €) and Germany (79 Mn €) as major sellers of quota and France (111 Mn €) and Italy (187 Mn €) as major buyers of quotas. Besides France and Italy the expansion of production is high in The Netherlands and in Sweden and a relatively large decrease in production is estimated for Spain, Germany, Great Britain, Ireland, and Portugal.

**Annex 6: Hypothetical example illustrating advantages of decoupled support**

Let us assume that there are four production alternatives with average gross margins per hectare varying from 500 € to 800 € and a fifth option of going out of production (see table A6). In addition the producer receives some transfer payments in three different scenarios. The first case (A) assumes payments which are coupled to the production of certain goods and these payments differ between products. This case represents the current system. In the second example (B) the payments are still coupled to production, but they do not differ between the products for which transfers are paid. This scenario would hold if the 2003 CAP reform would be implemented such that no coupling is left. As this is not the case in the medium term, reality would be placed in between (A) and (B). In the third scenario (C) payments are fully decoupled from production and would even be paid if farmers go out of business.

From a welfare economic point of view it is most favourable to produce what results in the highest gross margin as here the resources (land, labour, plant protection measures, etc) are used in a more efficient way. In the first scenario (A) coupled direct payments which differ between products have led to production decisions favouring the production with the second lowest gross margin result. An equalisation of the direct payments already leads to an improvement as the decision favours the most valuable production among the ones receiving direct payments. The third scenario (C), however, has further advantages. As the transfer payments are fully decoupled from production, the production decision is no longer affected. The decisions will favour production which achieves the highest gross margin. This may be, for some areas, even a crop which did not receive direct payments before (e.g. potatoes). Furthermore, farmers under scenario (C) have the additional option to go out of production themselves, while still keeping the transfers. They would in this case pass the production to other producers (by selling or leasing their land or the whole farm) who expand without receiving any additional aid for the additional area under crop. The latter option would most likely result in an increase in efficiency as the expanding enterprises will be able to realise scale economies\*.

**Table A6: Hypothetical example of coupled and fully decoupled direct payments**

		Gross Margin	Direct Payments (coupled)	Social Transfer	Net result
<b>(A)</b> Unequal coupled payments	I	840	0	0	840
	II	700	300	0	1000
	III	600	450	0	<b>1050</b>
	IV	500	300	0	800
	V	0	0	0	0
<b>(B)</b> Equal coupled payments	I	840	0	0	840
	II	700	350	0	<b>1050</b>
	III	600	350	0	950
	IV	500	350	0	850
	V	0	0	0	0
<b>(C)</b> Decoupled payments	I	840	0	210	<b>1050</b>
	II	700	0	210	910
	III	600	0	210	810
	IV	500	0	210	710
	V	0	0	210	210

\* Statistics actually show that with an increase in the ratio of leased land over owned land, the returns per hectare increase; see e.g. for Germany: BMVEL, 2004.

Source: Own fictitious example.

**Table A7: Summary of Main Policy Impacts**

Direct policy impact	Indirect policy impact	Proposed action
<b>Price support</b> (e.g. for beef, milk, sugar, oats, rye)		
leads to:	<ul style="list-style-type: none"> <li>• More environmental pressure</li> <li>• Increase in input prices (land, machinery, pesticides)</li> <li>• inefficient production (bias to products with higher support)</li> <li>• transfer efficiency of only 25% (i.e. only 25% of transfers reaches the farmer)</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce price support</li> </ul>
<ul style="list-style-type: none"> <li>• Higher input use</li> </ul>		
<ul style="list-style-type: none"> <li>• Increased production</li> </ul>	<ul style="list-style-type: none"> <li>• Budgetary burden to export 'oversupply' with subsidies</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce price support</li> </ul>
<ul style="list-style-type: none"> <li>• Often requires export subsidies</li> </ul>	<ul style="list-style-type: none"> <li>• Position in future WTO negotiations more difficult</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce price support</li> </ul>
<ul style="list-style-type: none"> <li>• Higher consumer prices</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced domestic demand</li> <li>• Net economic welfare losses (several billion € for the EU)</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce price support</li> </ul>
<b>Area payments</b> (e.g. cereals, oilseeds)		
<ul style="list-style-type: none"> <li>• Are adjustment aids to former price cuts</li> </ul>	<ul style="list-style-type: none"> <li>• Adjustment aids should be temporary and not endless income support payments</li> </ul>	<ul style="list-style-type: none"> <li>• Degressivity</li> </ul>
<ul style="list-style-type: none"> <li>• Capitalise in higher input prices (e.g. land)</li> </ul>	<ul style="list-style-type: none"> <li>• Transfer efficiency of only 50%</li> </ul>	<ul style="list-style-type: none"> <li>• Full decoupling</li> <li>• Degressivity</li> </ul>
<ul style="list-style-type: none"> <li>• Stabilise income for farmers</li> </ul>	<ul style="list-style-type: none"> <li>• Hamper the sectoral restructuring process if partially coupled</li> </ul>	<ul style="list-style-type: none"> <li>• Full decoupling</li> </ul>
<ul style="list-style-type: none"> <li>• Have a production and a trade effect</li> </ul>	<ul style="list-style-type: none"> <li>• Are 'blue box' measures and might be under pressure within the next WTO negotiations</li> </ul>	<ul style="list-style-type: none"> <li>• Decoupling</li> <li>• Degressivity</li> </ul>
<b>Set-aside restriction</b>		
<ul style="list-style-type: none"> <li>• Forces scarce resources to be unused</li> </ul>	<ul style="list-style-type: none"> <li>• Reduces the income of farmers and the value added of the sector</li> </ul>	<ul style="list-style-type: none"> <li>• Dismiss it</li> </ul>
<ul style="list-style-type: none"> <li>• Reduces supply</li> </ul>	<ul style="list-style-type: none"> <li>• Reduction partly offset by higher intensity of production on other land</li> <li>• Sectoral production costs increase</li> </ul>	<ul style="list-style-type: none"> <li>• Dismiss it</li> </ul>
<ul style="list-style-type: none"> <li>• Has no environmental benefits in net terms</li> </ul>		<ul style="list-style-type: none"> <li>• Dismiss it and target fragile areas explicitly</li> </ul>

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**Headage premiums** (e.g. beef, sheep)

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| <ul style="list-style-type: none"> <li>• lead to higher livestock densities (until the limit of 2 LU/ha of forage)</li> </ul> | <ul style="list-style-type: none"> <li>• Higher environmental risks</li> <li>• Increase in input prices (calves and land)</li> <li>• Inefficient production</li> </ul> | <ul style="list-style-type: none"> <li>• Degressivity</li> <li>• Full decoupling</li> </ul> |
| <ul style="list-style-type: none"> <li>• Have a production and a trade effect</li> </ul>                                      | <ul style="list-style-type: none"> <li>• Are ‘blue box’ measures and could be under pressure within the next WTO negotiations</li> </ul>                               | <ul style="list-style-type: none"> <li>• Full decoupling</li> <li>• Degressivity</li> </ul> |
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**Uneven support across sectors** (e.g. little support for flowers, vegetables, eggs vs. over 70% of farm income through support of beef, oats, tobacco)

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| <ul style="list-style-type: none"> <li>• affects production decisions</li> </ul> | <ul style="list-style-type: none"> <li>• distorted, less suitable, and inefficient production mix</li> <li>• Reduced value added in the sector</li> </ul> | <ul style="list-style-type: none"> <li>• Reduce price support primarily in most protected sectors (e.g. milk, beef, sugar)</li> <li>• Fully decouple support from production</li> </ul> |
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**Quota restrictions** (e.g. sugar, milk, tobacco)

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| <ul style="list-style-type: none"> <li>• Reduce supply</li> </ul>  | <ul style="list-style-type: none"> <li>• Preserves inefficient structures as production does not take place in most suitable areas and on most productive farms</li> <li>• Transfers part of sectoral support to non-farming holders of quota</li> <li>• Sectoral production costs increase</li> </ul> | <ul style="list-style-type: none"> <li>• Reduce price support to reduce value of quota</li> </ul> |
| <ul style="list-style-type: none"> <li>• Allows to shift the main burden of sectoral support to the consumers</li> </ul> | <ul style="list-style-type: none"> <li>• High burden for consumers (e.g. 17 bn € in 2002 for sugar and milk) against EU taxpayers (4.3 bn €)</li> <li>• Reduces the pressure for reductions in price support</li> </ul>  | <ul style="list-style-type: none"> <li>• Reduce price support</li> </ul>                          |
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