

An assessment of the major driving forces in the area of “economy and trade” which will contribute to shape the future of agriculture in Europe

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1. Introduction

The goal of this paper is to offer an analysis of some the major determinants which will contribute to shaping European agriculture twenty years from today. The mandated focus of the paper is on the key drivers related to “*economy and trade*”. Other relevant drivers which cannot be easily treated separately from those considered here are addressed elsewhere in the foresight exercise; these include drivers related to “*societal changes*”, “*rural economy*” and “*technology and science*”.

The organization of the paper is as follows: section two, which constitutes the core of the paper, identifies the main drivers for the future of European agriculture linked to “*economy and trade*” and briefly discusses what can be expected to happen for each of them; section 3 offers a description of what the European agro-food sector may look like in 2025 as a result of the contemporaneous developments in these key drivers as well as a brief discussion of the implications of the conclusions reached for the demand of research and innovation in Europe.

2. The major key drivers in the area of “economy and trade”¹

2.1 Globalization

Globalization is defined here as the progressive, rapid increase of the spatial size of the potential market for any given good. This market expansion is mainly the result of technological changes which (a) have allowed the diffusion of new information technologies which have lowered the costs of disseminating and accessing information as well as transaction costs, both in business-to-business and business-to-consumer exchanges; (b) have extended the life of perishable products; and (c) have led to the introduction of better and cheaper ways to transport food products. Another relevant factor in globalization has been increased people mobility.

The most relevant effects of market globalization are increased price-competition (for all products; domestically as well as internationally), the diffusion of “global products” (i.e. identical

¹ Studies which address the future of food and agriculture include Anania *et al.*; FAO (2003 and 2006); Léon, Perrier-Cornet and Soulard; OECD-FAO; Pinstrup-Andersen, Pandya-Lorch and Rosegrant; Rosegrant *et al.*; and Scenar 2020.

products which can be found in very distant markets) and a tendency towards convergence in patterns of food consumption.

The increased diffusion of “global products” implies scale economies and increased concentration in the industry producing them. The concern sometimes raised that the production of “global” food products, occurring on a larger scale, should carry higher safety risks is questionable; in fact, the contrary is more likely to be the case.

At the same time, and not in contrast, globalization favours an increased demand by an expanding segment of consumers (the relatively richer and more educated) for quality products, i.e. for products which are differentiated on the basis of specific *product* quality attributes (including, for example, its origin, or the fact that it does not contain GMOs)² or *process* quality attributes (including, for example, the product being the result of organic farming; having been produced respecting certain environmental, animal welfare or ethical standards well above those mandated by existing regulations; or being a “fair trade” product).

As a result of increased price-competition induced by market globalization, less competitive segments of European agriculture and food industry producing relatively undifferentiated products will find themselves unable to operate profitably.

As a result of the expansion of the markets for quality products, those components of agriculture and food industry which prove able to cope with the challenges of a globalised market will benefit from the increasing opportunities created by globalization. The biggest challenge they will face is less likely to be related to their ability to produce a quality product that consumers appreciate and are willing to pay for, than to their ability to develop strategies and adapt their structures to market it effectively globally.

2.2 Increased international competition as a result of trade policy changes

A second source of increased market competition for European agriculture comes from expected trade policy changes: multilateral, regional and unilateral trade liberalization.

Increased international competition will result from the reduction of barriers to trade due to:

- multilateral trade agreements (such as those reached within the WTO framework);
- regional trade agreements (such as the full implementation of the Euro-Mediterranean Association Agreements);

² Although mid term developments in consumer attitudes towards GMOs are still difficult to assess, the development and consolidation of market *segmentation*, with consumers being given the choice (through regulations on labelling) between GM and non-GM varieties is clearly one possibility.

- the creation of new custom unions or the extension of existing ones (such as the EU enlargement to new member states);
- the granting, or extension, of unilateral trade preferences (such as those granted by the EU under its Everything But Arms (EBA) initiative to least developed countries); and, finally,
- unilateral trade policy reforms.

In the 20 year time horizon considered in this exercise one should consider a number of possible trade policy developments, including: the reduction of border barriers to trade, both in the European Union and elsewhere; the enlargement of the European Union beyond Bulgaria and Romania, i.e. its possible enlargement to Turkey and the Balkans; the liberalization of trade in agricultural and food products within the Euro-Mediterranean Association Agreement framework; the liberalization of trade for agricultural and food products resulting from the Economic Partnership Agreements between the European Union and the ACP (African, Caribbean and Pacific) countries; deeper and wider unilateral trade preference concessions by the EU (i.e. increased preferential margins and the extension to new beneficiaries of existing preferential schemes).

In addition, it is important to take into consideration the expected increased capacity over time of beneficiary countries to exploit the potential benefits from the trade preferences they are granted.

Increased international competition resulting from trade policy changes will determine a marked “market reorientation” of agricultural and food prices in the EU, i.e. a much smaller wedge, if any, between domestic prices and those on the world market than is the case for many products today; at the same time, higher price volatility in the EU should be expected.

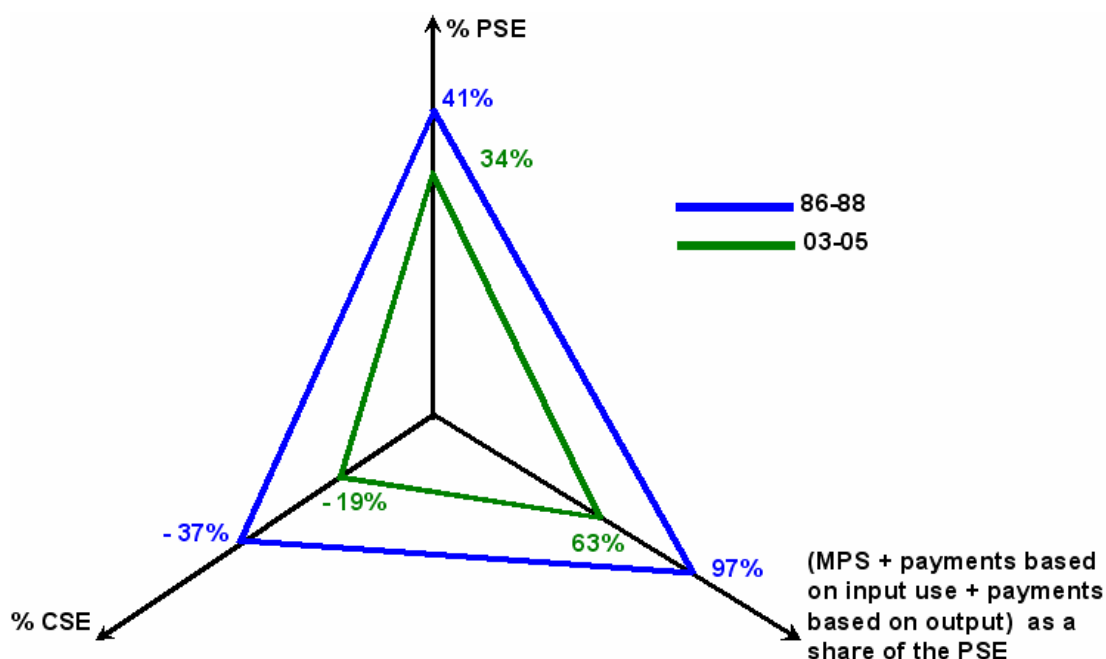
2.3 Further reforms of EU agricultural policies

In the past 15 years EU agricultural policies have been characterized by a progressive shift from a support fully “coupled” to production, (mainly) linked to “how much” farms produced (pre-1992), to a partially “decoupled” income support, (mainly) linked to “what” farms produced (1992-2003), to a “decoupled” support of historical beneficiaries of the Common Agricultural Policy (CAP) linked to “farming” or “land management activities” (post-2003).

These changes in the form of farm/income support have occurred at the same time as:

- (i) a reduction of financial resources devoted to agricultural policies, in real terms;
- (ii) a reduction of support indirectly provided to farmers by unknowing consumers through higher than otherwise prices for food products; and, hence,
- (iii) a progressive reduction of support.

Figure 1 - Evolution of European Union agricultural support between 1986-88 and 2003-05 (OECD).



Legenda: PSE Producer Support Estimate.
CSE: Consumer Support Estimate.
MPS: Market Price Support.

In Figure 1 changes between 1986-88 and 2003-05 in CAP support are showed based on some of the indicators calculated annually by OECD;³ three indicators are used:

- the per cent Producer Support Estimate (%PSE), which gives “*the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policy measures that support agriculture*” as a share of gross farm receipts;
- the per cent Consumer Support Estimate (%CSE), which gives “*the annual monetary value of gross transfers to (from) consumers of agricultural commodities, measured at the farm gate level, arising from policy measures that support agriculture*” as a share of consumption expenditure at the farm gate. If negative, the CSE measures the burden on consumers by agricultural policies, from higher prices and consumer charges.

³ OECD, various years.

- the sum of the most production- and trade-distorting forms of support (“*market price support*”, “*payments based on output*” and “*payments based on input use*”, as defined by the OECD) as a share of the PSE.

Figure 1 shows that developments in the CAP which took place in the 15 years from 1986-88, i.e. before the MacSharry reform of 1992, to 2003-05, i.e. immediately before the implementation of the 2003 Fischler reform, resulted in a reduction of the support to the agricultural sector (which declined from 41% of gross farm receipts to 34%), in a reduction of the implicit taxation of consumers (for every euro consumers spent on food the implicit taxation due to agricultural policies dropped from 37 cents to 19), and in an additional reduction of the distortionary effect of the CAP on production and trade, specifically due to its re-instrumentation (the share of the support linked to the most distortionary policy instruments declined from 97% to 63%).

The implementation of the Fischler reform will soon reduce further the %CSE and the production and trade distortions due to the CAP. The October 2002 decision by European Council regarding the financial guidelines of CAP budget expenditure and the enlargement of the EU to Romania and Bulgaria will bring a significant further reduction of the %PSE.

It is fair to expect in the 20 years from today a continuation of the observed trend of policy developments, which is likely to bring:

- a complete “decoupling” of farm support from food production;
- lower support of the agricultural and food sector;
- fewer financial resources available for agricultural policies;
- more selective support, i.e. farms which today receive very little or substantial support to progressively receive no support and less support, respectively;
- support to be made conditional on more stringent and more effectively enforced cross-compliance constraints;
- more voluntary schemes in which payments to farms occur in exchange for the production of specific non-market, but socially valuable, goods and services;
- more “space” given to national choices in the implementation of agricultural policies defined at the EU level.

In addition to these changes, which can somehow be seen as “*more of the same*” with respect to those observed in recent years, one could expect something new to be introduced in the instrumentation of the CAP, such as:

- new, and more effective, safety net policy instruments against out-of-the-ordinary drops in farm incomes;

- (b) a partial re-nationalization of agricultural policies;
- (c) targeted policy support for actions specifically aimed at increasing the market competitiveness of the European agro-food sector (such as support for structural adjustment strategies aimed at expanding farm size and/or capital as a means of reducing production costs; strategies aimed at strengthening production and marketing of differentiated products; strategies aimed at the production and adoption of technical innovations).

2.4 Increased international competition as a result of changes in relative competitiveness of agriculture in the EU vis a vis other countries

An additional source for increased market competition for EU agriculture will be changes in its relative competitiveness with respect to the agriculture of other countries as a result of factors other than domestic and trade policy changes, such as differences in cost-reducing structural adjustments, in the adoption of technological innovations (including, but not limited to, those which reduce costs), or in the specialization in differentiated quality products.

Within the time horizon considered in this exercise, attention should focus on the increased competitiveness of the agricultural and food processing sectors in the relatively more developed and more dynamic parts of the developing world; changes in relative competitiveness which will occur in least developed countries and other developed countries seem less worrisome.

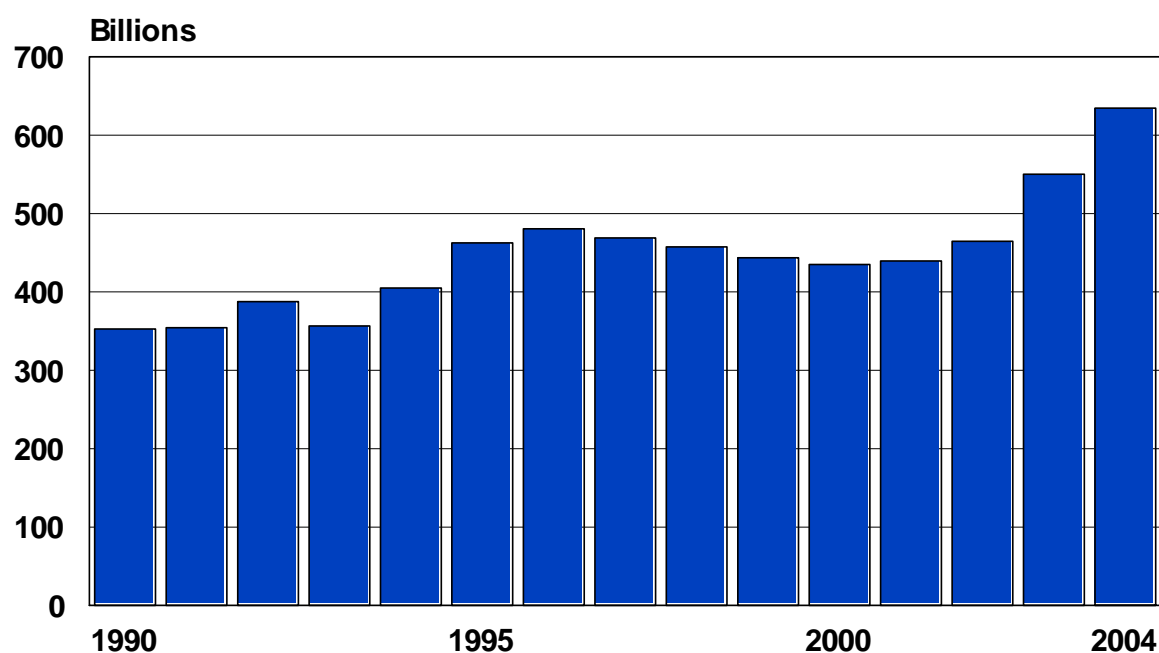
Among developing countries an important role will be played by further productivity and food quality improvements in the largest ones, such Brazil, China and, to a less extent, India.⁴ However, it is important to recognise that these supply-side factors should be considered together with demand-side developments in the same countries (i.e. demand increases as a result of increased population and per capita incomes).

In the past 15 years world trade in agro-food products increased (Figure 2). Developing countries did not gain market share; in fact, their total exports of agro-food products expanded, but the same occurred for their imports, and the net result was that their aggregate net trade deficit did not show significant improvements (Figure 3).

China became a net importer of agro-food products from being a net exporter (Figure 4), although this seems to be more the result of a government decision regarding consumption and investment choices than the result of changes in the relative competitiveness of China's agro-food sector (and, as a result, could easily change over a few years if that political decision is reversed).

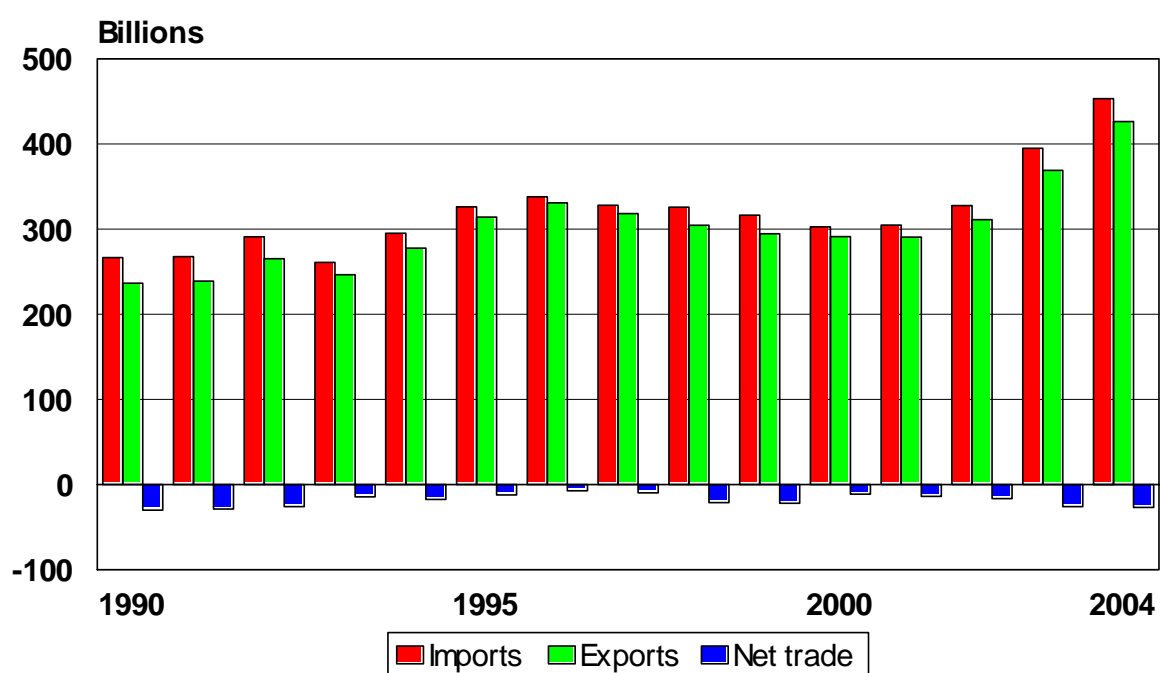
⁴ European Commission (2006b).

Figure 2 - Agriculture and agro-food products (raw and processed). World trade (US\$, 1990-2004).



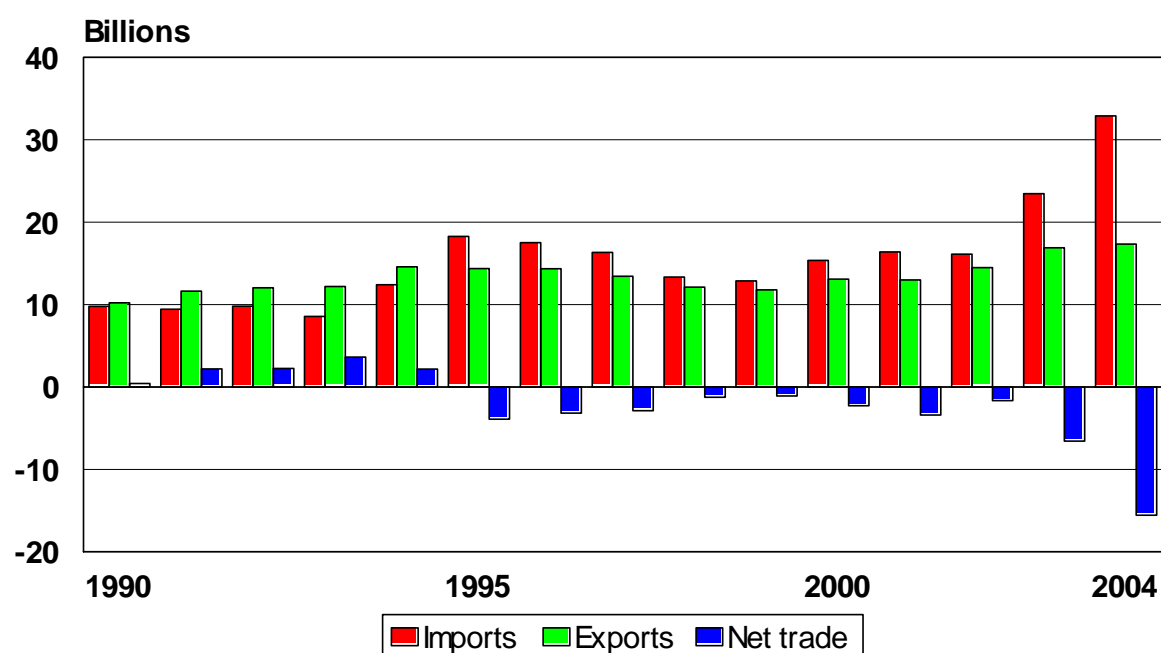
Source: FAOSTAT.

Figure 3 - Agriculture and agro-food products (raw and processed). Developing countries imports, exports and net trade (US\$, 1990-2004).



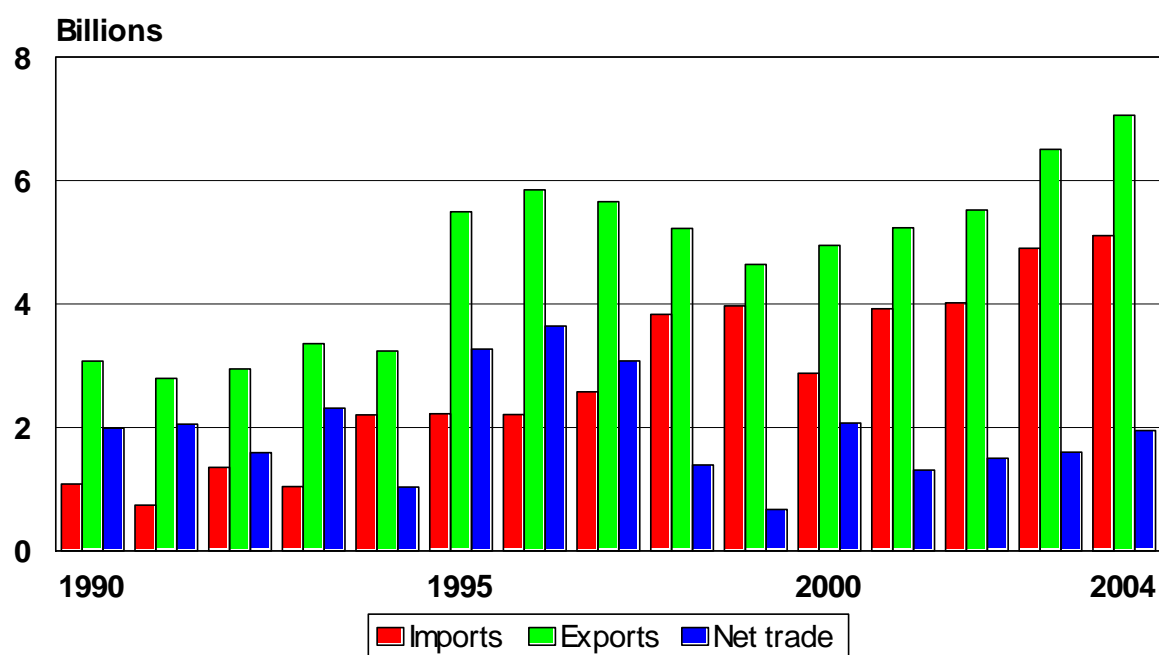
Source: FAOSTAT.

Figure 4 - Agriculture and agro-food products (raw and processed). China imports, exports and net trade (US\$, 1990-2004).



Source: FAOSTAT.

Figure 5 - Agriculture and agro-food products (raw and processed). India imports, exports and net trade (US\$, 1990-2004).



Source: FAOSTAT.

India has seen both exports and imports increase in recent years but its net trade surplus has declined (Figure 5).

At the opposite end, Brazil is among the very few countries which in the past 15 years increased agro-food exports while reducing imports. Brazil's net exports almost tripled between 2000 and 2004 and today it is the third world exporter of agro-food products (preceded only by the EU and the US) (Figure 6).

However, it is important to recognise that EU-15 relative competitiveness in the production of agro-food products does not show any decline between 1990 and today; on the contrary, with exports and imports both expanding, EU net agro-food deficit improves at a steady, albeit slow, pace (Figure 7). This is not the case, for example, for the US which over the same period faced a significant deterioration in their agro-food net trade balance.

Specific attention should be given to developments in agricultural and food production in transition economies. Agricultural productivity in European and former-USSR transition economies have been recovering very slowly from the sharp fall which occurred following the sudden institutional switch from planned to market economy.

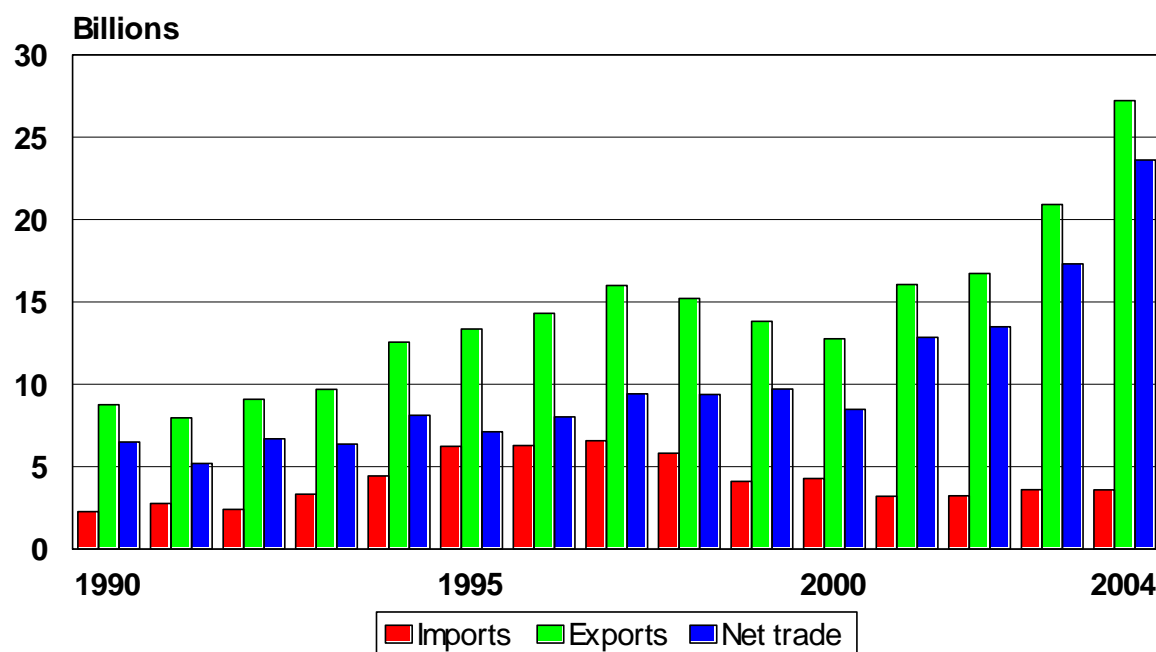
Most transition countries have experienced severe and persistent problems due to difficulties in introducing structural reforms as well as in identifying and enforcing land property rights, to weak institutions, market failures and lack of resources.

However, their potential for economically viable and efficient agro-food production is considerable, thanks to the large share of agricultural land farmed by large farms, relatively low labour costs, rapidly improving physical infrastructures, investment conditions, institutional environment and human capital. In transition countries which are, or are to become, members of the EU this catching-up process will be easier and faster than elsewhere.

Agricultural productivity and food quality in these countries will rapidly increase; production will increase above the expected increase in domestic consumption (due to rapidly increasing per capita incomes) and food quality standards will improve. As a result, within the time horizon considered in this exercise production in excess of domestic consumption will be competitively exported, increasingly to markets characterized by richer consumers and relatively more sophisticated food demands.

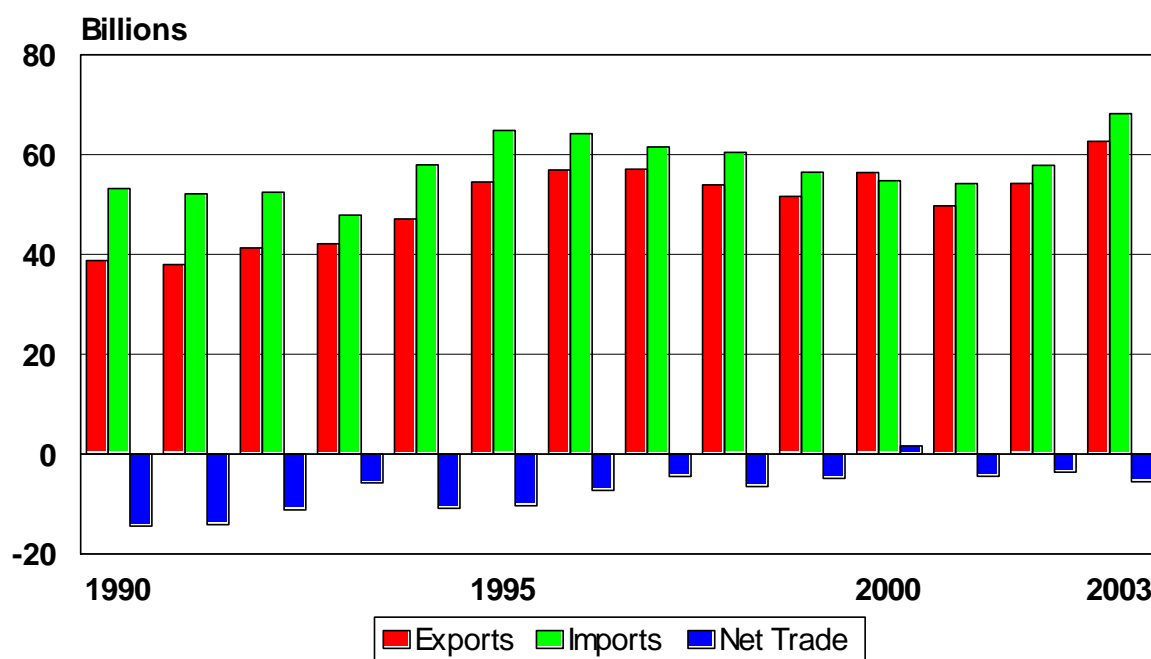
Different components of the agro-food sector in Europe will choose different strategies to face the increased competition to come, depending on their resource endowments. Some of them will choose to focus mainly on price-competitiveness, others will choose product differentiation as their

Figure 6 - Agriculture and agro-food products (raw and processed), Brazil imports, exports and net trade (US\$, 1990-2004).



Source: FAOSTAT.

Figure 7 - Agriculture and agro-food products (raw and processed), EU-15 imports, exports and net trade (US\$, 1990-2004).



Source: FAOSTAT (intra-EU trade excluded).

key to competitiveness. However, in the new environment there will be components which will find themselves unable to compete on either of these two dimensions.

2.5 Further structural changes in the food retail industry

The trends observed in recent years with respect to developments in the food retail sector will extend into the future. This means that we can expect to see:⁵

- (a) an increasing share of food sold to consumers in large stores everywhere in the world, in cities in developed countries as well as in rural areas in developing ones;
- (b) a rapid increase in the (already extremely high) rate of concentration of the food retail sector;
- (c) the setting by the retail sector of more private food safety and quality standards implying more stringent minimum standard requirements than those defined by existing public regulations (such as EurepGap, enforced today for fresh products);
- (d) the “decentralization” by the retail sector to its suppliers of food products of an increasing number of functions (such as packaging, pricing and logistic tasks needed in order to guarantee *just-in-time* deliveries);
- (e) the imposition of increasingly more restrictive requirements as a necessary condition for suppliers to be considered as potential sources, such as the capacity to deliver a “basket” of goods (rather than a single one), to provide large volumes and do so for an extended period of time throughout the year, all aimed at reducing the number of suppliers and, hence, transaction costs;
- (f) an increase in the imbalance in the distribution of market power along the food chain, with the highly concentrated retail sector holding significant and increasing market power *vis a vis* its suppliers.

Developments in the retail industry can be seen as an effective barrier for international as well domestic trade. For the domestic and foreign segments of the industry which will be able to provide the retail sector with the required product quality specifications and services, the private standards and other conditions imposed by the latter will serve as a protection from “rivals” who, though price-competitive, are unable to fulfil them (as in the case, for example, of developing country producers whose competitiveness derives mostly from lower labour costs).

The ability to satisfy these requirements implies effective *horizontal* cooperation among farms (in order to supply the required volumes of the products at the specified times and to guarantee

⁵ Brown; Codron *et al.*; Dries, Reardon and Swinnen; Fulponi; Henson and Reardon; Weatherspoon and Reardon.

product homogeneity), *vertical* cooperation or integration of farms with other actors along the food chain (in order to provide the logistic services), investments and adequate human capital.

These expected developments have strong implications for the agricultural sector, as they make it increasingly difficult to remain competitive in this strategic market segment.⁶ The competitiveness and economic results of an increasing number of farms will depend not only on their own competitiveness, but on the competitiveness of the “agro-food system” they are part of; the system will include other farms as well as actors of the agro-food industry and its competitiveness will depend not only on the competitiveness of the farms and firms involved but, at least in part, on the quality and strength of the local economy as well as of local institutions.

Only agro-food systems able to satisfy the conditions and the standards set by the retail sector will remain active on this growing share of the market, while the others will be progressively marginalized (unless they are able to profitably operate on a “*short*” supply chain, selling to consumers either directly, at local farmer markets or through internet, or through the rapidly shrinking “traditional” retail sector).

2.6 Economic growth

In the next 20 years per capita incomes are expected to grow in all regions of the world, although at different rates.

In Europe rates will be higher in (current and future) new member states than in EU-15; per capita income will grow at slightly higher rates in the other developed countries, while significantly higher growth rates will be observed in all developing country regions.⁷

The expected growth in per capita incomes will affect the *quantity* of food demanded in the developing world, the food *expenditure* and the *composition* of food demanded everywhere. Food expenditure will increase with per capita income. Food composition will change as, for example: meat consumption is expected to increase with per capita income in middle income countries and to decline with per capita income in high income countries; consumption of fruit and vegetables, fish, dairy products and higher-value food items is expected to increase with per capita income; and consumption of cereals and other carbohydrate-rich staple foods is expected to decline everywhere.⁸ These trends will receive a further push by lower food prices, in real terms,⁹ and urbanization.

⁶ Dries, Reardon and Swinnen; Henson and Reardon.

⁷ Scenar 2020, pp. 36-37.

⁸ FAO, 2004; Schmidhuber and Shetty.

⁹ Declining food prices in real terms for most agricultural commodities are foreseen in FAO (2004), OECD-FAO and Scenar 2020; simulations by IFPRI (Pinstrup Andersen, Pandya-Lorch and Rosegrant; Rosegrant *et al.*) forecast food prices in nominal terms remaining steady or falling slightly between the mid 1990s and 2020; forecasts by OECD

A significant and increasing share of richer and more educated consumers everywhere will demand differentiated products, i.e. products which possess a certain quality characteristic which (at least some) consumers perceive as making that product different from, and better than, similar ones and, hence, worth paying more for. Such quality characteristics are linked either to the product *per se* – such as, for example, its origin, quality characteristics relevant in presence of health/dietary concerns, or the fact that it does not contain GMOs, added growth hormones or has not been subject to irradiation – or to the production process – such as the product being the result of organic farming, having being produced in accordance with demanding environmental, animal welfare or ethical standards, or being a “fair trade” product.

Increased incomes and larger female participation in the labour market will lead to an increased demand both for more ready-to-be-consumed (convenience) food and for food consumed away-from-home.

In the absence of new relevant “*food scares*”, it can be expected that public confidence in food safety will remain at a level justified on the basis of effective monitoring activities of food chains by the public sector and of the even more restrictive quality standards imposed and effectively enforced on suppliers by the retail sector.

Increased incomes in developed and middle income developing countries will induce stronger and more widespread environmental concerns, which, on turn, will induce stronger societal demands for minimum environmental standards for agricultural production, more stringent environmental cross-compliance constraints to be eligible for policy-related payments (where these exist) and more, and more effective, voluntary schemes, in which farmers receive financial compensation if they agree to implement environmentally friendly (well above mandated minimum standards) production practices or to satisfy the growing demand for “public goods and services”, such as the maintenance of traditional rural landscapes, to which society attributes a value and is willing to pay for.

2.7 Demographic changes

World population is expected to keep growing in the next 20 years at a robust rate (possibly slightly below 1% per year); this is a slower growth rate than those observed in the past and is decreasing over time. European population is expected to grow at a very slow rate; most of the increase in world population will come from increases in developing and middle-income countries.

and FAPRI presented in European Commission (2006a) see prices in nominal terms slightly increase between 2005 and 2015.

Different birth and mortality rates will translate into differences in the age structure of the population. In countries/regions with higher rates of demographic growth younger generations will constitute a larger share of total population, while this will be the case for older generations where rates of growth of the population are negative or very low.

The expected growth in population, everything else held constant, will determine an increase in the *quantity* of food demanded; the expected changes in the age structure of the population, everything else held constant, will determine differences in the *quantity* and *composition* of food demanded. Per capita food demand will be higher where younger generations are a larger share of the population; the composition of food consumed will be different in countries/regions with different age distributions, with, for example, older people having more health-conscious consumption patterns.

2.8 Production of non-food agricultural products

In recent years the importance of the production of non-food agricultural products has been growing; this can be expected to become much more important in the years to come.

The most important component of non-food production by the agricultural sector will be energy sources, such as fuels, as an alternative to non-renewable or unsustainable ones. At current consumption rates, known petroleum and natural gas reserves are expected to last roughly 40 years; however, if the forecasted increases in energy demand in developing countries are taken into account, these energy sources will be exhausted sooner.¹⁰

Under current technologies ethanol production from sugar cane is significantly more efficient than from corn, wheat or sugar beet. Countries with relatively large land endowments are the most cost competitive in production of biofuels, as is the case for the production of ethanol from sugar cane in Brazil. However, should the EU decide to limit its dependence on energy imports, public incentives will make it profitable for farms to produce crops to be transformed into fuels.¹¹

For liquid biofuels the EU has set for itself the ambitious goal of reaching by 2010 5.75% of total used transport fuels (from less than 1 per cent today). According to Schenkel, should the EU-25 achieve the goal of replacing 5% of its expected total gasoline and diesel consumption by 2010 with domestically produced biofuels only, this would imply 20% of its cropland devoted to the production of sugar beet, cereals and rapeseed; by 2020 38% of agricultural land would be needed to substitute 10% of the expected consumption of fossil transport fuels. The assessment made in the

¹⁰ Schenkel.

¹¹ Incentives will probably be introduced as well to make production of energy from biomasses and forestry products profitable.

Scenar 2020 study is somewhat less pessimistic: meeting the 2010 5.75% goal entirely with domestically grown feedstock would require “only” 9.4% of EU-25 agricultural land, while producing 10% of energy requirements for transport in the same year could take up 43% of the land currently used to produce cereals, oilseeds and sugar beet and set aside. The magnitude of these changes in the European agro-food sector appears too large to be socially, economically and environmentally feasible, but they provide an idea of the pressure agriculture and food production in the EU may face as a result of the energy crisis and of the political decisions on the acceptable degree of dependence on energy imports Europe will have to make.

The significant increase of the production of non-food products by the agricultural sector in Europe will have a marked effect on the demand for land. As a result, it can be expected that:

- (a) marginal land which under current economic conditions is deemed to be unprofitable will be brought back in production;
- (b) land currently used to produce food products will be diverted to the production of crops to be transformed in biofuels.

This will put upward pressure on domestic prices of all food products, as a result of both increased production costs (due to the higher cost, or opportunity cost, of land) and the reduction in the supply of food products (due to land diversion). However, because in other parts of the globe land availability is and will remain less constrained than in Europe, as a result of the same drivers world prices of food products will increase less than in Europe. This means that the actual increase of food prices in Europe will depend on the degree of market protection in place (the lower the border protection of EU domestic food markets, the lower the increase in domestic prices as a result of increased production of biofuels, while production costs will still be higher). Because of the expected developments in trade policies discussed above, it is unlikely that by 2025 EU domestic food markets will still enjoy strong border protection from cheaper imports.

The impact of increased production of biofuels on agriculture in Europe will be significant, even within the relatively narrow time horizon considered here. The magnitude of the induced changes will mostly depend on (i) the increase in the price of fossil fuels, (ii) the effectiveness of the actions taken to reduce consumption of traditional fuels in transportation, (iii) the level of subsidization of the production of biofuels in the EU (and the linked decision about the role of imports of biofuels) and (iv) the degree of market protection for food products.

2.9 Agriculture and local development

The share of the agro-food sector in the economy, in terms of GDP and employment, and that of agriculture within the agro-food sector will both continue to decline, everywhere.

Everything else being held constant, structural changes in agriculture will be influenced by local development through the effects of the latter in terms of quality of life, competition for land use, availability and quality of services for farming and, eventually, family decisions related to land, labour and financial resource allocation. These decisions include: those related to family labour allocation between farm and off-farm activities; those by off-farm working family members to migrate or to stay in the area; family choices related to consumption and saving, to invest in agriculture or in other activities, to farm the land, despite negative profits, to rent it out or to leave it idle.

In developed and more advanced developing countries diversification processes in rural areas will continue and will yield an even wider spectrum of situations than that observed today; in most cases agriculture will not play a central role in the economy of rural areas.

2.10 Climate change

Climate change will bring increased temperatures, make extreme weather events, such as temperature peaks, floods and droughts, more likely and reduce water availability. If current trends do not change, by the end of the century this will significantly affect agro-food production in Europe by modifying crops suitability, yield levels and variability, product quality and production costs. For a variety of reasons, agriculture in the Mediterranean regions appears to be more vulnerable to the expected effects of climate change than elsewhere in Europe.¹² In the medium term, climatic changes may produce positive effects in higher latitude regions and mountainous areas, by making the introduction of crops and varieties feasible, increasing yields and expanding cultivable areas; however, in the longer term the net benefits in these areas become more uncertain.¹³

In 2002 agriculture contributed to 9% of the total EU-15 greenhouse gas emissions.¹⁴

By 2025 the *direct* effects of climate change on European agriculture will be minimal, limited to adaptation strategies by farmers; within this time horizon, these are not expected to affect crop patterns and farm structures significantly. In the short run the most relevant effects for agriculture will rather be those from the actions which will be taken to mitigate current trends in climate

¹² EEA; Olesen.

¹³ Stern.

¹⁴ Olesen.

change, such as the taxation of greenhouse gas emissions or the introduction of regulations on the handling and disposal of manure in livestock operations, which will increase production costs.

3. World food markets and European agricultures and food industry in 2025

The main characteristics of the world agro-food trade environment and European agriculture in a 20 year time horizon resulting from the key drivers which have been identified above - and ignoring many other relevant ones which are the specific focus of other contributions within this foresight exercise - can be summarized as follows:

- Agricultural prices will continue to decline in real terms.
- World food production will continue to increase at a higher rate than world population; were food be equally distributed, there would be enough to feed everybody, both globally and regionally. Malnutrition will diminish but will not disappear; in most instances it will remain a problem of poverty, i.e. a significant share of world population lacking sufficient means to access an adequate (in quantity and quality) food intake. Malnutrition will become more and more spatially concentrated and conflicts will remain an important factor in explaining it.
- World agro-food trade will continue to grow; developed countries' agro-food imports and exports will both expand and the same will occur in developing countries. Developing countries' aggregate share of world exports will not change significantly while their share of imports may increase. The share of developing-to-developing country agro-food trade on world food trade will increase.
- The share of processed products in agro-food trade will increase, both in developing and developed countries.
- Quality differentiated, higher value, food products will be demanded and consumed by an increasing share of richer and more educated consumers, both in developing and developed countries.
- Non-food products, mostly biofuels, will be a significant share of world agricultural production.¹⁵
- Everywhere a large and rapidly increasing share of food will be sold in large stores; the already high concentration of the food retail industry will continue to increase.

¹⁵ The impact of the increased production of biofuels is expected to mitigate, but not to reverse, the otherwise expected downward trend in prices for food in real terms.

- Domestic and international markets will be much less distorted by policy interventions. Price volatility for widely traded goods will decline in markets which today are relatively less distorted and will increase in those which are currently more protected.
- Because of the significantly lower border protection, European agro-food systems will be exposed to increased price competition, both domestically and internationally, from systems able to produce at low cost agricultural “commodities” or products with a relatively low level of differentiation.
- At the same time, trade policy liberalization and market developments will translate into global market opportunities, as well as increased competition, for European quality differentiated products.
- Agricultural and food systems in the largest among EU new member states will see significant productivity growth and improvements in their capacity to satisfy product standards required by the retail sector and quality characteristics demanded by relatively more affluent consumers.
- Because of the expected changes in domestic agricultural policies (including full decoupling of support, more stringent cross-compliance constraints, and the introduction of new policy incentives for farms to adopt environmentally-friendly production practices), European agriculture will be less intensive in its exploitation of physical resources.
- Employment in European agriculture will continue to decline, both in absolute and relative terms; this decline will be only partially compensated by increased employment in the non-agricultural components of the agro-food sector.
- Because of increased competition and significantly lower, possibly minimal, direct and indirect public support, a significant portion of European farmers will progressively find themselves operating unprofitably. Their relative importance in terms of land used and incomes generated is much smaller than in terms of number of holdings. In most cases the income generated by the farm activity is already a minor component of overall family income. The probability of a farm finding itself in this position will be higher the smaller it is, the poorer the quality of the resources it uses, the less quality differentiated its products, the less horizontally and vertically integrated it is, the weaker the economic environment around it.

- The importance of agriculture in the economy of rural areas in Europe will continue to diminish. Social and economic diversification of rural areas in Europe (in terms, for example, of average income, sign and magnitude of income changes, composition of economic activities, demographics (attraction/loss of population; age structure), availability (quality and quantity) of material as well as immaterial infrastructures) will continue to increase.

In very simple terms, in the new scenario three main clusters of farms will emerge:

1. farms which, based on their resource endowment, will be active on markets characterized mainly by price competition and will be able to adapt successfully to the foreseen changes;
2. farms which, based on their resource endowment, will be active on markets characterized mainly by competition based on product differentiation and will be able to adapt to the foreseen changes and effectively produce and market quality differentiated products;
3. farms which will not be able to adapt and compete profitably; because of the redesign of agricultural policy instruments and the drastic reduction in public support, a significant share of the farmers involved will leave agriculture. The actual share of the farmers who will quit farming will depend on several factors, including their socio-demographic profile and the characterization of the local economy. Part of the land currently used by those farms which will stop being active will remain unused, while part will be farmed by other farms, which will now be able to expand in size and use that land more efficiently.

While many European farms will be able to adapt to the new environment and successfully face price competition, for many others this is not an option due to their structural constraints, which limit the possibility for them to reduce production costs of relatively undifferentiated products. This is typically the case of smaller farms; average farm size in 2003 of 25.4 hectares in Belgium and 29.9 in Finland (vs., for example, 57.4 in the UK, 54.7 in Denmark and 45.3 in France, to limit the comparison within the boundaries of the EU), and of 4.8 hectares in Greece and 6.7 in Italy (vs., for example, 22.1 in Spain) signal clearly the existence of a wide area within European

agriculture characterized by binding structural constraints limiting the possibility to compete on production costs.¹⁶

Hence, for many European farms positioning themselves on markets characterized by product differentiation is not a choice but the only alternative. However, the structural constraints which prevent them successfully competing on prices constitute a major problem as well in competing in differentiated product markets; producing and marketing quality products effectively and efficiently is easier and more likely to occur in larger farms than in small or medium ones.

The number of farms which will fall in the third cluster crucially depends on the government action taken to support them to do what is needed, depending on the strategy they adopt, in order to remain or become competitive.

Two main priorities for public intervention aimed at supporting competitiveness of European agro-food systems seems to emerge:

- actions to support structural adjustment, targeting farms, food industry firms and agro-food systems who already are, and need to remain, competitive, and those who can become competitive as a result of the restructuring;
- actions to strengthen the production and adoption of innovations aimed at reducing production costs as well as improving the wide spectrum of product quality characteristics demanded by consumers and/or required by the retail industry.

The increased competition European agro-food systems will be exposed to in the less distorted, less protected market environment envisaged for 2025 means that their competitiveness will crucially depend, more than today, on maintaining a *technology-based competitive wedge*, i.e. a competitiveness based on innovation, a factor for which Europe has, and will maintain, a comparative advantage with respect to its more aggressive competitors.

It is important to underline that maintaining a *technology-based competitive wedge* is crucial for all European agro-food systems, regardless of their choice with respect to their strategic market positioning.

The ability to maintain this *competitive wedge* depends on the capacity to *continuously produce and rapidly adopt* technological innovations in a wide spectrum of areas, related to both the reduction of production costs and the improvement in the wide spectrum of product quality characteristics demanded by consumers and/or imposed by the retail sector. A detailed discussion of

¹⁶ It may be useful to underline that, while average farm size significantly increased over time in most countries, between 1987 and 2003 it *declined* both in Italy and Greece.

which specific priorities would best address the need for maintaining a *technology based competitive wedge* goes beyond the mandate of this paper; however, they should include product innovation, innovation in the production processes, innovation in post-harvest technologies, innovation in marketing, innovation in the services sold with the product, from traceability and safety risk minimizing technologies to transportation and packaging services.

Finally, maintaining a *technology-based competitive wedge* requires much more than researchers producing technological innovations. Timing is a strategic factor in keeping a *technology-based competitive wedge*, as most of the benefits from an innovation last until competitors have adopted it. This means that competitiveness will depend as much as on producing innovations which are useful and feasible for the European agro-food systems, as on making sure that all possible actions are taken to facilitate a quick and smooth adoption process. Maintaining a *technology-based competitive wedge* implies addressing the challenge of strengthening the linkages and assuring cooperation and coordination among all main actors along the *research-development-extension-adoption* chain. This could imply the need to develop an *integrated innovation policy plan* for the agro-food sector. Among other things, addressing this challenge may possibly imply considering:

- designing and implementing innovation policy plans for the agro-food sector which extend over research, development, extension and adoption activities at the same time, including relevant public actions in each of these links of the chain within a single integrated action plan; this is needed in order to facilitate integration of the different activities and limit the possibility of bottle-necks along the process reducing the effective exploitation of the potential benefits deriving from the adoption of innovations from research results by end users;
- involving in an on-going, structured dialog and sharing of information agro-food stakeholders along all links of the relevant chain (from farm input suppliers to the retail sector) and research institutions, to define and revise on a regular basis short and medium term priority plans for applied, publicly funded research;
- making a large number of potential adopters aware of current research and development activities and, even more important, directly involve them in the latter, in order to reduce the time of delivery and adoption of innovation;
- introducing more effective incentives for publicly funded researchers and research institutions to implement effective dissemination activities as part of their mandate,

again, with the goal of reducing the time and cost of adoption of the innovation by end users;

- introducing effective monitoring and evaluation systems of publicly funded research activities;
- significantly improving the effectiveness of extension activities in the agro-food sector, involving potential end users in the organization and running of the services as well as in covering part of their costs.

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