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Effective Rate of Assistance for the Biofuel Production Chains in Europe

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Abstract

The rising enthusiasm for biofuels can be observed in many developing and developed countries, including the European Union (EU). The European Commission has set ambitious substitution targets and a wide support scheme for biofuels. One of the main declared objectives is the support to farmers. The purpose of the paper is to analyze if policy is coherent with that objective. It tries to identify who is being most beneficiated by this program: farmers themselves or the biofuel industry? To do so, the Effective Rate of Assistance (ERA) is calculated for biofuel producers and farmers in some selected European countries. The results show that the current support policy scheme in Europe is resulting in much higher ERAs for the industry when compared with the one for agricultural producers. More, this gap is likely to rise in the future.

Introduction

The rising enthusiasm for biofuels can be observed in many developing and developed countries, including the European Union (EU). The European Commission has set ambitious substitution targets and a wide support scheme for biofuels. The main declared objectives are (a) support to farmers, (b) environmental concerns and (c) energy security issues. One question that imperatively arises from it: is the European biofuel policy consistent with those objectives? The objective of the paper is to identify if one of those objectives, the support to farmers, is being actually reached by such policy.

Even with all the support given, some studies point that farmers capture only a small share of the total added value from biofuel production. Mainly, the largest share goes to the biofuel and the gasoline industry (HENNIGES AND ZEDDIES, 2006). Also, according to Gohin (2007), the implementation of the biofuel consumption target of 5.75% in 2010 in the EU would generate an additional value added to the European agricultural sector of 3.2 billion euros. However, those gains are limited by the public expenditures related to the implementation of the program (estimated by him on 10.5 billion euros). It concludes that the current European policy is not a "good one". Those results would indicate that the European biofuels policy is far from the best solution to support the European agricultural sector. He argues that therefore, it could not be justified in such grounds.

The analysis in this work does not seek to define the "*raison d'être*" of the European biofuel policy. It does not qualify nor try to justify why one of the discussed objectives (agricultural support, environment and energy security) should come before the others. This is not a paper that will discuss the feasibility and the sustainability of the declared goals. Instead, the research just focuses on one of those, the support to farmers, and wishes to analyze if policy is coherent with it. The question that it tries to answer is: who is being most beneficiated by this program, farmers or the industry?

The applied tariffs on biofuels and of the agricultural commodities are the common way used to measure the level of protection of such products. However, there are other policies in place that can impact the level of support in the sector (e.g. tariffs on the inputs affect the level of support granted to the output). The calculation of the Effective Rate of Assistance (ERA) is a better way to analyze how policies are impacting the resource allocation due to a trade support scheme. In this study, the ERA is calculated in different steps of the biofuels production chain for different countries. It could be an important input for policy makers as it would indicate which sectors are being most protected: the agricultural producers or the industry. Such estimate has never been done for the biofuel production chain in Europe.

The calculation of an ERA can lead to wider public understanding of the costs imposed by a given assistance structure. By indicating the problems of such structure, it can help the development of reforming methods and the likely benefits of such reforms. “*An informed public is more likely to support policies which benefit the community as a whole and oppose those which protect particular sectional interests at the expense of the general well-being*” (IC, 1995)

In the first chapter, an overview of the biofuel industry in Europe is presented. The recent growth in biofuel production and an overview of the fuel for transportation market is shown, as well as the overall tendencies on European international trade on biofuel and on the agricultural products used as feedstock. It then develops a specific country analysis, showing how this sector has evolved in some EU member states. The countries chosen are Germany, France, Spain and Sweden. Those are, respectively, the three top biofuel producers and a country that has being developing its biofuel program for a long time. General data on production, consumption, production capacity and new investments are presented.

Then, in chapter two, the policies of support for biofuels in the EU are described. First, the general motivations are discussed and the main European directives presented. Then, this description is done in both, communitarian and state levels. Also, the main support for the agricultural feedstock is briefly described as it is necessary for the calculations of the ERA for the raw products.

Chapter three discusses the concept of Effective Rate of Assistance. The ERA is a further development of the original Effective Rate of Protection (ERP) concept. Therefore, first, a brief review of the literature on ERP is described. The ERA concept is then introduced, followed by its main definitions, objectives and assumptions. Finally, the main critiques of such concept are presented.

On the fourth chapter, the ERA in 2006 is calculated for ethanol and biodiesel producers and for wheat and rapeseed producers in four selected European countries: Germany, France, Spain and Sweden. It allows not only a cross industry analysis, but also a cross country one. First, the methodology of calculation and the assumptions made are described. Then the results and the analysis that yield from those are presented. Finally, some limitations of such methodology are discussed.

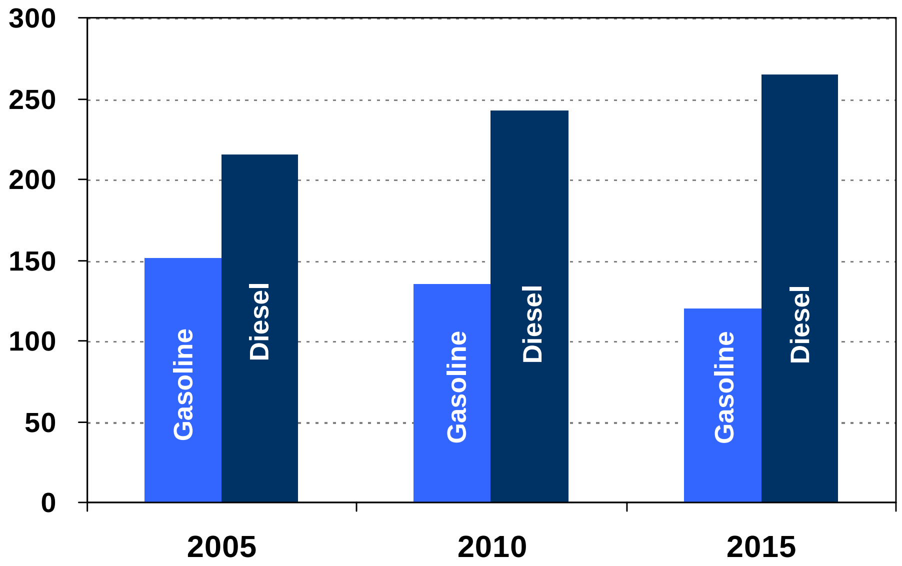
Finally, the main conclusions of this study, some final remarks, policy indications and suggestions for further research are presented.

1. Overview of the biofuels industry in Europe

The EU is the second world consumer of oil, behind the United States. The transportation sector represents 30% of overall energy consumption in Europe. Such transport demand for energy has grown constantly over the past years. It is predicted to increase by 2% per year over the coming decade. Oil accounts for 98% of that consumption. The two main oil products used for transportation are diesel and gasoline. Different from the US, the EU, as a whole, consumes more diesel than gasoline. In the coming decades this gap is expected to increase (Figure 1). Biofuels share in total energy transport consumption is quite modest, it represented only 1.8% of that demand in 2006 (EUBIA).

In either liquid form (e.g. ethanol or biodiesel) or gaseous form (e.g. biogas or hydrogen) biofuels are basically transportation fuels resultant from biological sources (IEA, 2004). The liquid ones have drawn more attention as they can easier replace the current fossil ones being used. Ethanol and Biodiesel are by far the most widely used for transportation worldwide. While the first can replace gasoline use, the second does it for diesel. They can be used either as an additive (in low blends) or as a substitute (in higher blends or even in their pure form). Both are mainly produced using agricultural feedstock. Ethanol is mainly made out of corn, sugar cane, sugar beet, cereals and cassava. Biodiesel can be made with pretty much all types of biological oils, such as animal greases, disposed oils or vegetable ones. However, the vast majority of world biodiesel production comes from vegetable oils internationally traded, such as rape’s, sunflower’s, soy’s and palm’s.

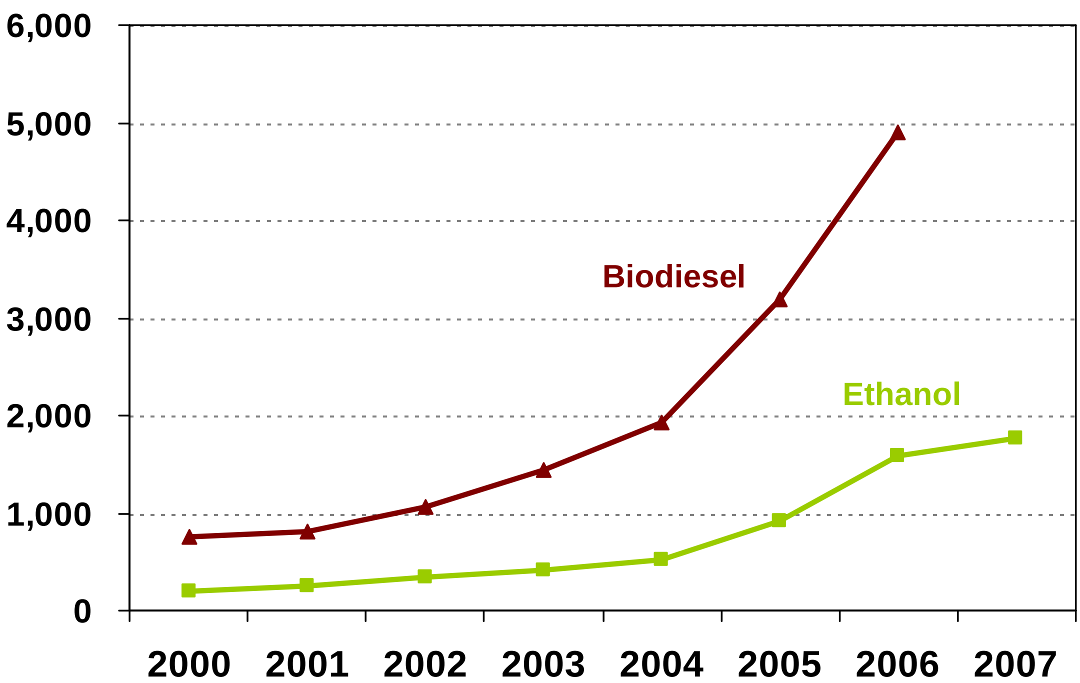
Figure 1 - Fossil fuel consumption in the EU (billion liters)



Source: Amaral (2007).

Note: data for EU-27.

Figure 2 - Biofuel production in the EU (‘000 tons)



Sources: EBB and Ebio.

Biofuels have been produced in Europe on industrial scale since the 1990s. Biodiesel has developed in a faster pace when compared with ethanol (see Figure 2). There are two potential explanations for that. First, the EU is a net importer of diesel and a net exporter of gasoline. Also, some important countries consume more biodiesel than gasoline in achieving their road transportation needs (KUTAS et al., 2007). Only considering energy security issues, it would make sense to focus on biodiesel.

In 2005 and in 2006, EU biodiesel companies were very profitable. The EU has faced shortages of biodiesel to accomplish its consumption targets and the excellent profit margins have encouraged the industry to produce not only for domestic demand, but also for other EU member state's consumers (USDA, 2006a). Even though the importance of intra trade in biodiesel is known, there is no data available for biodiesel trade inside the European Union.

On the other hand, international trade of biodiesel is almost insignificant. Also, it is almost impossible to identify exactly the amounts being traded. Biodiesel is internationally classified under the tariff line 38 24 90, following the Harmonized System code. However, its description is very wide[1] and does no include only biodiesel. In the EU, until December 2007, biodiesel was classified under the line 38 24 90 98 (until December 2006, it was classified under 38 24 90 99)[2] (EBB, 2007). It still fails to allow a detailed analysis as it continues to include other chemical products that are not biodiesel. Even with these difficulties, biodiesel imports are estimated in 145 million liters in 2006 and 600 million liters in 2007 (USDA, 2006a). According to the European Biodiesel Board, this sharp rise is mainly resulted by subsidized exports from the United States. The board claims that US producers are exporting biodiesel under a blend that is constituted by 99% biodiesel and 1% diesel. Because of that, they are receiving the $1 per gallon subsidy for each gallon blended just by adding a "drop" of fossil diesel. This way they would receive a subsidy that could sum up to 0.2 euros per liter and then export it to the EU to fully benefit from the European subsidy scheme (EBB, 2007).

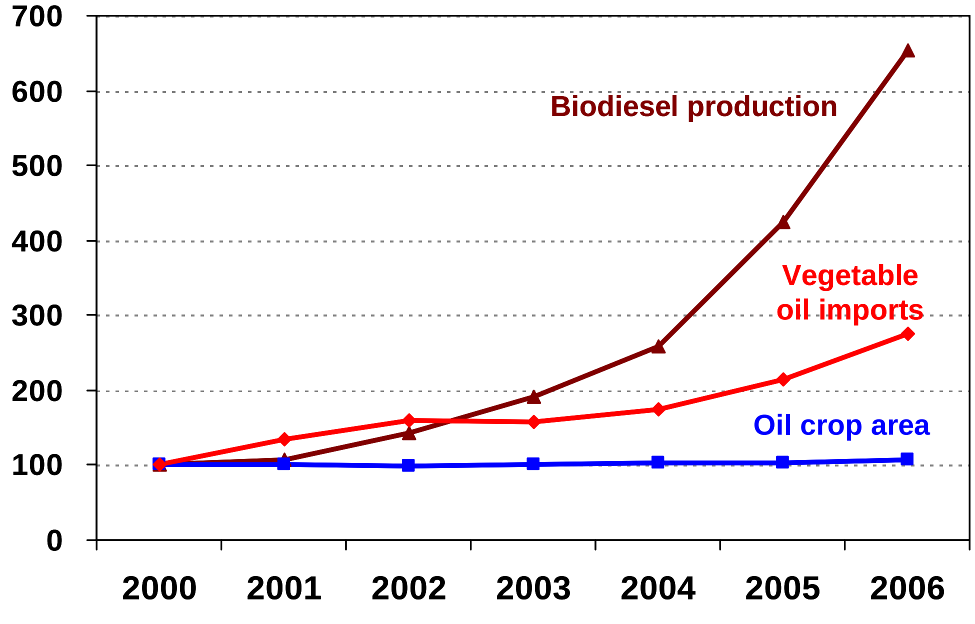
Concerning the inputs used, almost 90% of all biodiesel produced in Europe uses rape oil as its feedstock (JANK et al., 2007). It is followed by soybean and sunflower oil. Palm oil, recycled oils and animal fats are also being used, but in a much lower scale (USDA, 2006a).

[1] Description of the HS 382490: "Other Prepared binders for foundry moulds or cores; chemical products and preparations of the chemical or allied industries (including those consisting of mixtures of natural products), not elsewhere specified or included"
[2] Even though the EU uses a tem digit tariff code, trade data is only available at the 8 digit level.

Those percentages might change from country to country, but rape continues to be most important one in all the major producers.

Given all that, the growing production of biodiesel also has enormous influence on the vegetable oil market in the EU. Figure 3 shows the evolution of biodiesel production compared to oil crop harvest area and vegetable oil imports. It is clear that, even with the growing demand, local producers are not being able to respond as fast as necessary. The biofuel industry is then going abroad to supply its production. The next graph shows where those flows are coming from and which the main oils are. Palm oil is easily identified as the most important import. It also has experienced impressive growth. However, the majority of the imported palm oil is used in the food industry, many times as a substitute for rape oil which is becoming very expensive due to biodiesel demand.

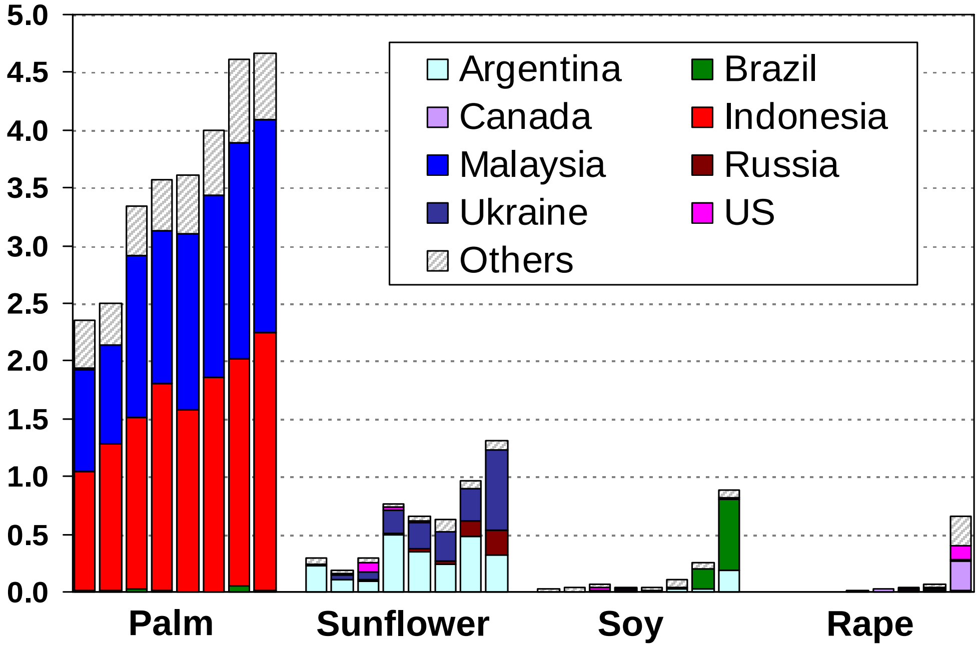
Figure 3 - Biodiesel production, oil crop area and vegetable oil imports in the EU



(2000=100)

Source: EBB, Eurostat and FAO.

Figure 4 - UE-25: Vegetable oil imports 1999-2006 (million tons)



Source: Amaral (2007)

As mentioned before, different from biodiesel, the ethanol industry in the EU is not as developed, it does not figure between the top producers in the world. The European Union is behind the US, Brazil and – depending on the statistical sources, the type of ethanol (fuel, non-fuel or both) and the number of EU members – China or even India. In 2006 it was responsible for only around 3% of the world production.

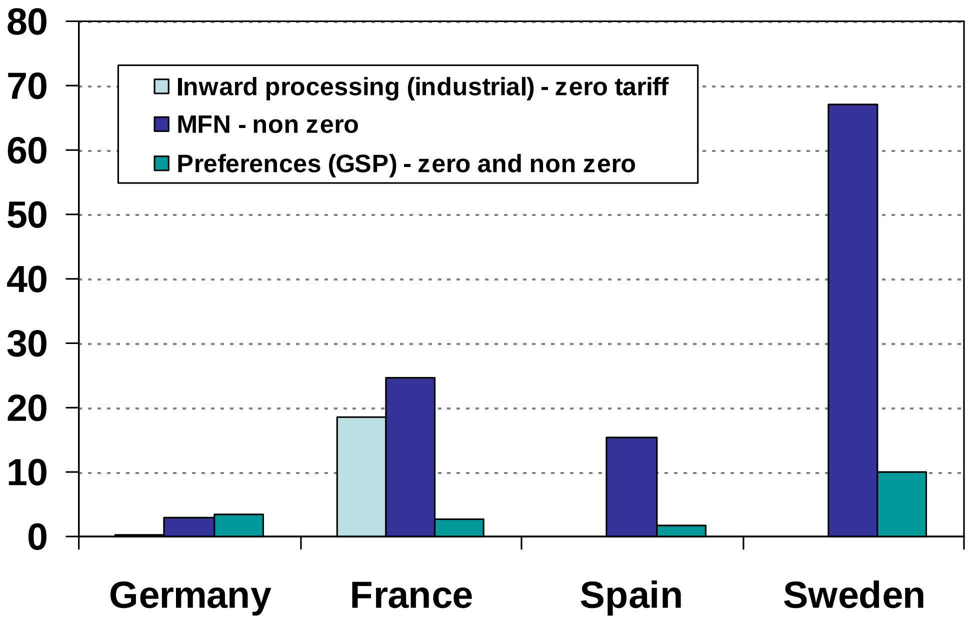
As there are not many large ethanol producing countries in the EU, intra block trade is not as important as it is for biodiesel. Import competition remains a very important concern for the EU ethanol industry. Prior to 2006, a loophole in the trade legislation allowed large amounts of fuel ethanol to come in without paying the import duty. Sweden was the country that mainly utilized it. In January 2006, however, this loophole was closed (USDA, 2006b).

It is also important to point out that, just like biodiesel, ethanol trade statistics are also problematic. Given the current version of the Harmonized System, fuel ethanol is not distinguished from non fuel ethanol. Ethanol is classified as either undenatured alcohol (HS code 220710) or as denatured alcohol (220720). Undenatured ethanol is the type of ethanol that can be found in alcoholic beverages, whereas denatured ethanol contains some added substances that make it unfit for human consumption. Ethanol for fuel purposes can, however, be classified as both. There i,s, thus, no separate classification or sub-classification for ethanol specifically used as fuel, as opposed to ethanol destined for other (non-fuel) uses (HOWSE and al, 2006).

As a consequence, ethanol data on international flows must be viewed with care. According to the data published by Eurostat, the EU-25 imported 524 million liters of ethanol in 2005, considering both fuel and non fuel and 575 million liters in 2006. Jank et al. (2007) estimate that fuel imports in that period amounted to 250 in 2005.

Here, an exercise is made as an effort to allow a more detailed analysis of the EU extra block imports. The extra block import data of ethanol is presented according to the tariff regime. Ethanol imported for industrial uses are exempt from the tariff duty. After the legal loophole was closed, it is possible to assume that all the imports under that regime are not of fuel ethanol. Figure 5, shows the imports of total ethanol in the selected EU countries according to the duties paid. Ethanol fuel imports are, potentially, the sum of MFN non zero and preferential imports.

Figure 5 - Ethanol extra block imports by regime in 2006 (million liters)



Source: Eurostat

Opposed to the world's largest producers, US and Brazil, in which the biofuel is produced with a single crop, the European countries base their production in a large variety of feedstock. Cereals account for a major part, followed by sugar beet and wine. Many countries have not yet started to produce ethanol. Therefore, it is not easy to predict the shares of each feedstock in the future as all countries engage in achieving the EU consumption targets. Jank et al. (2007) estimate that the larger potential for expansion relies on wheat, sugar beet and corn. In the case of sugar beet, such expansion is not expected to be based in increased area nor production. Ethanol will become an alternative destination for beet producers due to the reforms of the European sugar support.

That variety of feedstock, in combination with the fact that the level of production is much lower than biodiesel's, makes the impacts on agricultural production less intense. The consequences on the imports of agricultural crops are also mild. For example, in 2006 the use of wheat in ethanol consumption represented only 1.3% of total wheat production in Europe that year (JANK et al., 2007). Also, the second feedstock used for ethanol production in the EU, beet, is not tradable internationally as it is not economically feasible.

Once the overlook of the industry in the whole of the European Union is given, in the next pages the situation in some key European countries will be presented. Those countries were chosen as the top three biofuel producer's in the Union (Germany, France and Spain) and an important consuming State (Sweden). Those are the same ones chosen for the calculations of ERAs.

1.1. Germany

The country is the world largest producer and consumer of biodiesel. In 2006 it produced more than 3.7 billion liters of it, using almost all of the country's production installed capacity (see Table 1). In 2007 the country had 30 biodiesel plants in operation (KUTAS and all, 2007). The great majority German production uses rape as its feedstock.

Lower oil prices combined with the recent changes in the German support (see the following chapter) have currently reduced demand for biodiesel in Germany when compared to the previous year. As the country is the world's largest consumer, it also affects some biodiesel industries in other European countries. The reduced demand has also reduced potential exports of biodiesel from other EU coutries to Germany (USDA, 2006a).

Germany is also one of the two biggest European producers of ethanol. The country had 6 ethanol plants operating in April 2007, and there are plans for the construction of 19 more. Ethanol production in the country is based on cereals; however, an important part of it relies on corn and distilled wine.

1.2. France

France is the second European largest producer of biodiesel. The 2006 installed capacity was around 1 billion liters. There are 5 biodiesel plants operating in France. The biggest biodiesel company in the country (Diester) is currently building five new plants. In addition to that, there are 15 new production facilities being constructed. The estimated installed capacity for 2012 is of 4.6 billion liters (KUTAS and all, 2007).

The country, like the majority of EU members, uses rapeseed as its main raw material for biodiesel production. In 2006, the share of each feedstock was estimated at: 80% rape, 10% sunflower, 5% soybean, 2% palm and 3% others. (USDA, 2007)

France is the third largest producer of ethanol in Europe. There are currently 15 plants in operation in the country. Tereos is the leading group in that sector, owning 7 of those plants. There are 5 new plants under construction.

Different from other EU member, cereals are not the most important feedstock for ethanol production in the country. Only 20% of the existing installed production capacity is based on cereal use (Figure 6). Being the third producer of ethanol in the European Union, France is currently the only member state to significantly produce ethanol from sugar beet. However, there is significant potential for expansion based on this feedstock in France and in other countries as well, as it may become an alternative for beet growers due to the reforms of the Common Market Organization (JANK et al., 2007).

1.3. Spain

Even though there are currently ten biodiesel and four ethanol plants operating in Spain (GAIN, SPAIN), biodiesel production and consumption are much smaller than ethanol's (Table 1).

Spain is the second largest producer of ethanol in Europe. Between 2004 and 2006 the country's production grew by 56%. It is quite an impressive mark, but lower than the ones experienced in many other EU countries (KUTAS et al., 2007). There are four ethanol producing plants in the country and 4 new ones in the pipeline. Abengoa is the most important company, owning 3 of the four plants currently in operation (EUROBSERV'ER, 2007), which represents around 95% of the current installed capacity.

Like the majority of the European countries, Spanish production of biodiesel and ethanol is based on rape and cereals respectively (see Figure 6).

1.4. Sweden

Biodiesel production and consumption in Sweden are quite small. The country is a net importer, depending a lot on the big EU producers. Like Spain, ethanol is the most common biofuel in Sweden. It represented around 90% of total liquid biofuel use in 2004 (USDA, 2006b).

The country is a long time consumer of ethanol. Production is largely surpassed by the country's consumption needs. Sweden produced only 23% of the amount it consumed in 2006, the lowest share between the analyzed countries. It imports significant quantities not only from other EU members but from other producers as well, mainly Brazil.

Even though the majority of the ethanol is used as a blend in gasoline, Sweden has one of the most important Flex Fuel Vehicles (FFVs) fleet in Europe. Many car companies (Volvo, Saab and Ford) have FFVs available on the Swedish market. The government has also some ethanol fuelled buses, as well as part of the captive car fleet, used in the public transportation system in Stockholm.

The production capacity in the country is quite well distributed. However, even if the country is capable of producing sugar beet ethanol, almost 80% of its production is based on cereals. The remaining percentage is based on wood through fermentation of sulphite liquor, a by-product of paper pulp production (KUTAS et al., 2007). As Sweden is a significant wood and paper producer, the country is very interested in the development of third generation biofuels.

It could become an important producer when that technology becomes economically available.

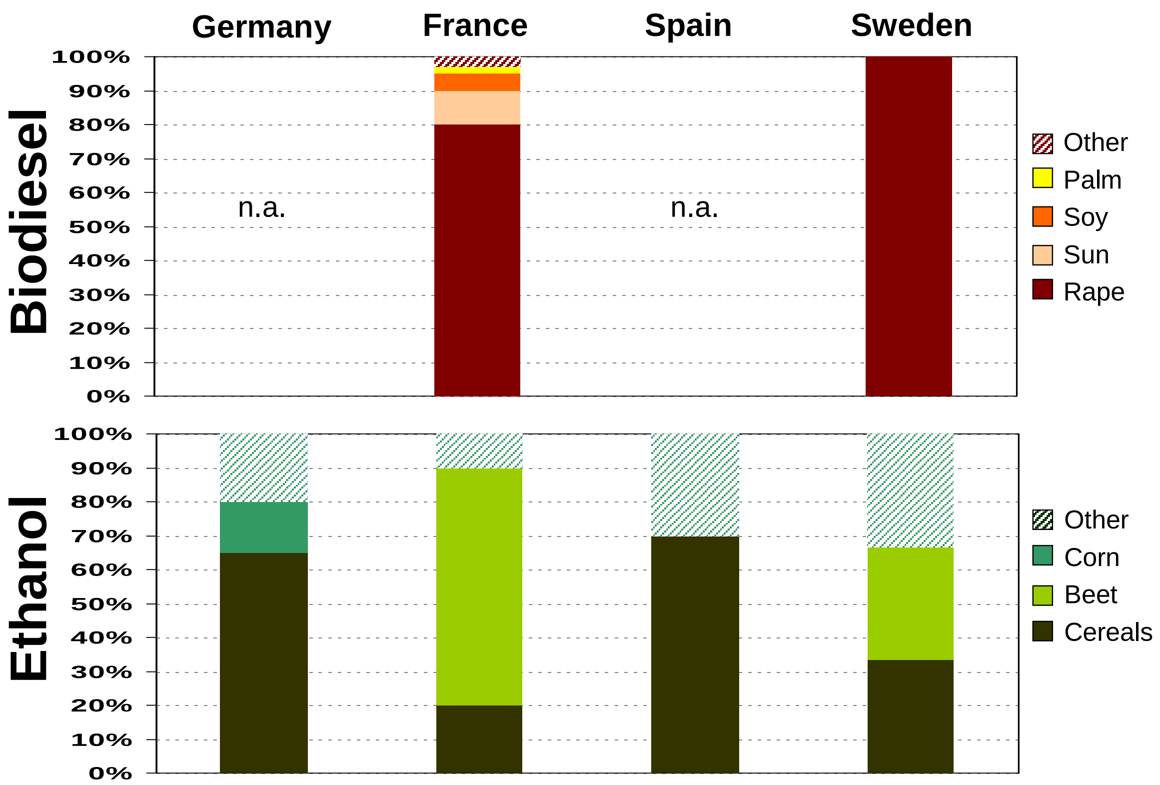
Table 1 - Biofuel situation in selected countries - 2006 (million liters)

	Installed Capacity*	Production	Consumption
Ethanol			
Germany	734	400	608
France	554	297	297
Spain	760	401	227
Sweden	150	73	322
Biodiesel			
Germany	3 753	3 727	3 920
France	1 085	1 040	866
Spain	314	139	102
Sweden	73	18	84

Sources: EBB, Ebio, Eurobserv'ER (2007), Fo Licht (2007) and Kutas et al. (2007).

Notes: * Operational in apr/07 for ethanol and jul/06 for biodiesel. Conversion used, liters/ton: 1266 for ethanol and 1400 for biodiesel; toe/tons: 0.64 for ethanol and 0.86 for biodiesel.

Figure 6 - Share of each feedstock on biofuel installed production capacity by country



Source: Fo Licht and USDA.

Notes: n.a. not available. For ethanol, based on all plants operating in Apr/07. When a plant used more than one feedstock, it was assumed equal shares for each one.

2. Support policy for biofuels in Europe

In 2003 European Commission approved two new directives aimed at encouraging the development of biofuels in the Union. It was a beginning of a new policy wave targeting the encouragement of biofuels production and consumption. The period of its adoption was not randomly chosen. The same date marks a very important reform at the Common Agricultural Policy in Europe (CAP).

The main objectives of the CAP reforms, further complemented by several texts, was to convert the common policy in a more market oriented one. One of the most important reforms was the price decoupling of several support payments with the creation of the Single Farm Payment (a support scheme cased on historical payments and disconnected from current production, prices or products)[3]. Such restructure of the agricultural support scheme generated several concerns about the future of the European agriculture.

The rise of the new European policy towards the production and consumption of biofuels fits in that context. The first article of the directive 2003/30/ec states the following:

> *This Directive aims at promoting the use of biofuels or other renewable fuels to replace diesel or petrol for transport purposes in each Member State, with a view to contributing to objectives such as meeting climate change commitments, environmentally friendly security of supply and promoting renewable energy sources.*

In the preamble, it also states:

> *Promoting the use of biofuels in keeping with sustainable farming and forestry practices laid down in the rules governing the common agricultural policy could create new opportunities for sustainable rural development in a more market-orientated common agriculture policy.*

The three main objectives of the support policy for biofuels could then be classified as: (a) support to farmers, (b) environmental concerns and (c) preoccupations with energy security.

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[3] For further information see: KUTAS, G. 2006. "EU Negotiating Room in Domestic Support after the 2003 CAP Reform and Enlargement". São Paulo and Paris: Institute for International Trade Negotiations (ICONE) and Groupe d´Economie Mondiale (GEM), Sciences Po, June 2006.

It is clear that an important part of the Commissions' intentions with the development of the biofuels initiative was a way of compensating some farmers for the reforms on the agricultural support schemes. With the objectives set by the Directive EC 2003/30 for of biofuels incorporation in the EU25[4], more than 30 million tons of grains will be needed. That would represent almost the double of the 2006 production (TREGUER, 2007).

As stated in the introduction, this study aims to indicate if that objective of the biofuel European policy, support to farmers, is actually being attended by the structure of the current support.

Having that in mind, this chapter will describe the measures of support in force in Europe that relate to the production and consumption of biofuels and its feedstock. It will describe in both, the communitarian and national levels, the measures aimed directly at the biofuel industry but also the ones granted to the production of the primary agricultural commodities. All that is necessary for the calculations of the ERA.

2.1. European Union (communitarian measures)

2.1.1. Incorporation target

As noted before, the development of biofuels in the EU has experienced an important shift in 2003 with the Directive EC 2003/30. This communitarian text stipulated a 5.75% incorporation target (in energy equivalent terms) of biofuels in road transportation fuels by 2010. However, this was not an obligatory objective. There were no legal constrains. Some countries have gone beyond and passed local legislations making it obligatory or even increasing the targets. In many of those countries, a tax exemption was also implemented to compensate the higher costs of such blends[5], as it will be discussed latter.

Member States were required to set indicative targets for 2005. However, with the arrival of that date biofuels counted to 1% of transport fuel. Table 2 shows the market share for biofuels

[4] 5.75% in energy equivalents.
[5] Biofuels have higher production costs than fossil fuels in the European Union.

in 2005 in the selected countries. It is possible to see that Germany was the most advanced one, fallowed by Sweden.

Table 2 - Market share and for biofuels in selected EU countries (2005)

	in energy content
Germany	3.75%
France	0.97%
Spain	0.44%
Sweden	2.23%

Source: Kutas et al. (2007)

In January 2008, the European Commission published the "Proposal for a new directive on the promotion of the use of energy from renewable sources". It sets a legally binding minimum target for biofuels of 10% of vehicle fuel by 2020 in each member state. Those bindings are, however, "subject to production being sustainable"[6] and to "second-generation biofuels becoming commercially available". On the text, the Commission concludes that the target for 2010 is not likely to be achieved; expectations are for a share of about 4.2%. The 2010 target remains into force, but it also remains indicative.

2.1.2. Border protection

Most favored nation (MFN) ethanol imports face a specific tariff of 0.192 euros per liter of non-denaturized ethanol and 0.102 liter for denaturized ethanol. The absolute majority of European imports are on the 220720 tariff line, therefore, it is plausible to assume that the tariff for fuel ethanol is 0.192 euros per liter.

Between 2002 and 2004 only around 30% of the imported ethanol in the EU paid the totality of the tariff (TREGUER, 2007). Imports from several countries are exempt, or have a tariff reduction, due to several preferential agreements (JANK and al, 2007). This is not, however, the case of the world top producers. The majority of ethanol imports come from countries with no preferences (Figure 5).

[6] "biofuels counting towards the targets achieve a minimum level of greenhouse gas savings" and they aim "for a complete harmonization of biofuels sustainability criteria in order to ensure that no criteria adopted individually by Member States may constitute an obstacle to trade between Member States" (EUROPEAN COMMISSION, 2008))

The tariff on biodiesel is lower than the one in ethanol. It also has a problem of tariff line classification. The tariff line for biodiesel in the European Union was 38249099 until December 2006, when it was changed to 38249098, according to the European Biodiesel Board (EBB). In both cases, the description and the duty remained the same, 6.5%. As discussed before, the definition of such lines is incredibly broad[7] and can include several products. It imposes vast difficulties when trying to identify trade flows and import/export prices of biodiesel in the E.U.

Finally, there are potentially important technical standard's that could serve as border protection. The Commission published in 2003 some quality guidelines for biodiesel. Those indications limit the iodine value of biofuels. In practical terms, it limits the use of soybean oil made biodiesel. Another potential limitation is for palm oil biodiesel. Palm oil has a high cloud point, meaning that it starts to solidify in low temperatures. It also limits its use on biodiesel use in Europe. However, the use of some additives and winter grades could overcome that problem (KUTAS and al, 2007).

2.1.3. Excise-Tax exemptions

The Energy Taxation Directive, Directive EC 2003/96, allows national governments to exempt biofuels, partially or totally, from the fuel excise tax. The commission has to approve the concessions made by member state. It has never denied one so far (KUTAS et al., 2007).

The tax exemptions are usually granted for unlimited quantities of biofuels. However, some countries have set quota systems. These schemes limited the quantity of biofuels that could benefit from tax exemption. One of the objectives of these systems is to limit the government expenses. Also, with those quotas governments can control the expansion of biofuels production. Finally, it allows the government to exclude imports from outside the EU.

[7] It always falls on the "other" category: 38249098 - Prepared binders for foundry moulds or cores; chemical products and preparations of the chemical or allied industries (including those consisting of mixtures of natural products), not elsewhere specified or included; other; other; other; other.

2.1.4. Direct payments

2.1.4.1. Distillation measures

Beginning in 1999 a program called "crisis distillation of wine" was introduced to dispose wine surpluses. The alcohol produced with the support of this scheme must be disposed of outside the potable alcohol market, either for industrial or energy uses. Kutas and al (2007) estimate that 675 million of liters of alcohol were produced under the crisis distillation in 2006. According to them, 50% of it (342 million liters) was fuel ethanol.

That measure includes a € 0.13 payment per liter of wine as aid for distillers and € 0.11 of aid for storage and disposal costs.

Some speculate that the crisis distillation has become obsolete and it has been criticized by many. The new EU wine regime proposal is expected to substantially change that program and, therefore, end the economic feasibility of transforming wine into ethanol (USDA, 2006a).

2.1.5. Support for feedstock (primary agricultural commodities)

The Common Agricultural Policy (CAP) is one of the most important elements of the institutional system of the European Union. Almost all the decisions are made in the communitarian level and the schemes are the same between the member states. Usually, the most important differences are between the EU-15 countries and the 10 new member States. In this study those differences are not as relevant as we consider only EU-15 States in the analysis. There might be, however, differences in the implementation period of the communitarian measures between countries.

2.1.5.1. Energy crop payments

In 2003, with the CAP reform, a new energy crop payment scheme was introduced in the EU. For each hectare used for the production of crops for energy uses (e.g. biofuels, heat, electricity), an aid of € 45 per hectare is provided.

All energy crops, except sugar beet, are suitable for it. However, the reform of the European sugar market will potentially allow the inclusion of sugar beet on the energy crop scheme beginning in 2007.

At the beginning, only the EU-15 states were eligible, but at the end of 2006 the European Agricultural Ministers decided to extend it to all EU members.

Not all the crops used for biofuels production benefit from the payment. The system for applying for the aid is quite complex and some farmers just do not apply for it. Also, as farmers are obliged to commit the amount of the production which will be subject to the payment to the energy processors before they send the application, they lose their capacity to decide to whom to sell it by the time the harvest arrive. Finally, there is a quota limiting the amount of area eligible. It is currently set at 2 million hectares (including all E.U. member states), however it was never fulfilled.

2.1.5.2. Decoupled direct payments

The European Common Agricultural Policy faced an important reform in 2003. The main objectives were to convert the CAP into a more market oriented support scheme, while ensuring the safeguard of the rural economy. It introduced a single payment scheme (SPS), also referred to as single farm payment (SFP), that decoupled the majority of the direct payment from products and from production. The new SFP aims at supporting farm income, independently of the commodity produced. Actually, there is not even an obligation to produce to receive the payment. However, farmers are not allowed to grow fruits and vegetables, table potatoes or beet sugar on land that is eligible to those payments. By limiting the production decisions, such constraint could be interpreted as a contradiction with the first objective of developing a market oriented scheme (KUTAS, 2006).

The SPF scheme came in operation in 2005, but some countries could delay its implementation. The amount of the payment is calculated on the basis of the direct aids a farmer received in a reference period (2000-2002).

2.2. Country specific measures (selected countries)

2.2.1. Germany

Biofuels were totally tax exempted in Germany until 2006 (from 2004 also in blended form). The government has recently decided to change the tax system and it will gradually introduce tax on biofuels. However, the consumption of biofuels in agriculture continues tax free. It also introduced a mandate system for fuel distributors. Beginning in January 2007 biodiesel and ethanol blended pay a full tax with the introduction of a mandate blending system (PREMIA, 2006).

Germany does not grant tax exemption for low blends of biofuels. They rely on obligatory consumption targets for supporting the development of low blends. On the other hand, they do have special exemptions for the high blends (e.g. E85) and pure biofuels (e.g. B100). They usually need special distribution systems and that has been holding down the development of such in the country. Only 30 gas stations sell E85, the B100 distribution, on the other hand, is more developed. There are 1,900 stations selling the product in its pure form in the country.

The commercialization of pure biodiesel blend was quite representative in total German consumption. However, as said before, the government cut down the tax exemptions and put into place a mandatory biofuels blend. It is based on a quota system; only quantities above that quota will be granted with the exemption. For the high blend of ethanol (E85), the full tax exemption continues to be applied to any quantity as it remains quite inexpressive. According Kutas et al. (2007), the objective of the government was to reduce the budgetary pressure caused by the tax exemptions.

2.2.2. France

France established a biofuels incorporation target, beginning in 2006, as a complement to the communitarian one. Although those are not mandatory, distributors have to pay a special tax (general tax on polluting activities), in addition to the usually applied on fuels, if they do not achieve them. As that tax is quite significant, it is possible to assume that it works as a mandatory target (KUTAS and al, 2007). Also, quotas are granted to blenders who qualify them for the tax exemptions are a way of limiting total spending.

2.2.3. Spain

Spain provides a full tax exemption for biofuels. However in the last national report on the implementation of directive 2003/30/EC, for 2006, the Spanish government affirms that given the current trend on petroleum production costs and on biofuels, the General Budget Laws of the State may increase the current zero tax.

The country, along with Sweden, was one of the main countries pushing for an increase in the allowed blend of ethanol in gasoline, from 5% to 10%, on the new European Commission Directive on the quality of petrol and diesel fuels (USDA, 2006b).

2.2.4. Sweden

Both biofuels enjoy full tax exemption in Sweden.

As discussed before, ethanol is the main biofuel in the country and the focus of governmental policy. Since 2004, all 95-octane petrol must contain 5% ethanol (KUTAS and all, 2007). Also, the Sweden government encourages the development of FFVs (Flex Fuel Vehicles)[8]. In 2006, 18% of all new vehicle registrations in the country were FFVs. In 2006 the country had 415 gas stations offering E85.

Biodiesel is allowed to be commercialized in either, blended or pure form. But its importance in Swedish biofuels consumption is still very limited.

3. The Effective Rate of Assistance concept

This chapter will make a review of the literature about the Effective Rate of Assistance (ERA). But to do so, first, it is necessary to present the concept of Effective Rate of Support (ERP). The two concepts are based on the same analytical scheme. The ERA is basically a

[8] Vehicles that can run with all combinations of ethanol and petrol.

development of the ERP that allows the inclusion of different types of support measures that would not otherwise be included.

To do this, first, a brief presentation about the history of the ERP and the ERA is presented. The definition and objectives of the effective rate concept are then described, followed by the main assumptions needed for such calculations and the respective critiques about them. All those are mainly directed to ERP but are definitely applied to the ERA as well.

3.1. History

Barber (1955) was the first author to ever come up with a distinction between apparent, or nominal, and effective protection. This was the starting point of an idea that was then completed by a formalization done by Corden in several works (1966 and 1971b). Johnson (1965) referred to both Corden and Barber and developed even further the model. But, potentially, one of his main contributions was to include the implications of the concept to trade negotiations. He also played a major role in stimulating the first two important empirical studies about the ERP: Balassa (1965 and 1971) and Baselvi (1966). From then on, an enormous quantity of empirical work has being developed. In the late 70s and 80s, a set of key critical studies that marked the history of the ERP were produced. The main ones were Sampson (1974), Bliss (1987), Either (1977), Bhagwati and Srinivasan (1973) and even Corden (1971a). The majority of the critiques have been made to the relevance of the ERP concept, especially when substitution is allowed between inputs (see section 3.4). But the truth is that, even with its limitations, the index continues to be widely used as en empirical tool in many studies by important organizations, such as the World Bank, OECD, Australian Productivity Commission and so on.

Max Corden is considered one of the "fathers" of the concept of effective protection. In a text called "Effective protection and I" (2005) the author describes how this concept entered the Australian policy world. He explains how the Australian government progressively adopted the effective protection as a guide to policy making decisions and analysis. Also, it is described how the Australian Industries Assistance Commission developed a more complete version of this index. The effective protection concept was expanded to "effective rates of assistance" (ERA).

The ERA is an extension of the ERP concept. The theoretical scheme is the same; however, the ERA allows the introduction of other types of measures of support in the calculation. It includes not only tariffs and taxes, but also other interventions that can impact the returns to value adding factors in an industry. The ERA measure is simply the percentage deviation of assisted value added from unassisted value added.

The ERA is particularly useful as it:

- can include most forms of barrier and non-barrier assistance to industries;
- includes both the benefits and costs of assistance to individual industries;
- provides an indicator of the extent to which the overall structure of assistance advantages or disadvantages an industry relative to other industries;
- provides a consistent measure across the traded goods sectors of the economy;
- provides a consistent measure over time; and
- provides a single, easy-to-grasp indicator of the net incentive effect of the many different forms of assistance. (IC, 1995)

3.2. Definition and objectives

The effective rate concept is, broadly, the percentage increase in value added per unit in an economic activity which is made possible by the support structure relative to the situation in the absence of tariffs but with the same exchange rate. The general ERP formula is the following:

$$g_j = \frac{v_j^{'} - v_j}{v_j}$$

Where;

g_j = *effective rate*

$v_j^{'}$ = *value added per unit of output under protection*

v_j = *value added per unit of output without protection*

The objective is to show, in a single figure, the support to some products given the country's tariff structure. Effective rates measure the net assistance provided by tariff protection. The calculation of a positive effective rate allows us to incur that the returns earned through a certain activity with intervention in place are greater than those that would be earned without such intervention. The opposite is true for negative effective rate. Finally, for effectives rates equal to zero, the protection factor is neutral and the returns are the same.

The estimation of ERAs can provide an indication of the extent to which some activities are favored relative to others as a function of assistance policies. The main difference is that the calculation of the unassisted value added considers several support policies, and not only the tariff structure.

By quantifying the industry assistance it is possible to enable decision makers to be more informed and choose better policy decisions that could lead to better allocation of a community's scarce resources. It can lead to improved welfare in the given community. The potential for the assistance structure to distort decisions depends greatly on the differences between the levels of assistance in the analyzed activities. The potential distortion in the use of the scarce resources will be more important when wide disparities in ERA levels exist between activities. Likewise, wide disparities in nominal rates on output indicate efficiency losses in consumption (IC, 1995).

Therefore, this concept has to be used in comparative analysis. The absolute value of an ERA does not say much about a support scheme as a ranking of ERAs does. The differences between the effective rates are the factors defining reallocation, not the absolute values. If two industries have the same ERAs, resources will not reallocate: "equal assistance is no assistance".

3.3. Assumptions

The effective rate concept is based in important assumption that is needed in order to develop the calculations. Those assumptions allow the construction of a single measure which is relatively easy to understand. In this section they are presented.

The major assumptions in the calculation of the ERA are listed in Table 3. The violation of these assumptions does not necessary invalidate the measure for comparative purposes. It is important to have in mind that those assumptions emphasize the approximate nature of the

ERA estimations, therefore, for policy purposes, small differences in the measurements should not be treated significantly (IC, 1995).

Table 3 - Key assumptions of the ERA calculation

a) Perfect substitution between domestic and foreign goods of the same description.	This assumption allows the assistance effects of border interventions, and other policies such as domestic pricing schemes, to be measured from comparisons of domestic or landed duty paid prices with landed duty free prices of similar goods for import-competing goods, and from comparisons of domestic with export unit returns for exported goods. To the extent that the similar goods chosen for the comparisons are less than perfect substitutes, the assistance effects of the interventions would be over estimated.
b) No substitution between nominally different goods	To the extent that different goods substitute for each other, the assistance to one product can affect the level of assistance to another. For example, assistance which increases the price of a good will divert demand toward a close substitute. The substitute indirectly benefits from the assistance through this increased demand. Conversely, competition from close substitutes which may be unassisted can undermine the assistance to a particular product.
c) Infinite elasticities of export demand and import supply (small country assumption)	This is often called the 'small country assumption', and means that the demand for imports and the supply of exports do not affect the world price of goods. This assumption does not hold if changes in the quantity of exports, or changes in the demand for imports, are large enough to alter the world price. This can be a serious limitation of once-only estimates. But when estimates are made regularly to monitor policy reform, there is an automatic adjustment to changes in benchmark prices, and hence to the estimates, as a result of such things as aggregate shifts in world trade supply and demand.
d) The direction of trade in the absence of assistance can be assessed, with import-parity prices forming the benchmark for goods assessed to be import competing and export-parity prices for export goods	Often the stronger assumption of the existing trade orientation is used for assessing the direction of trade. In Australia's experience, the direction of trade assumption is likely to be a contentious issue for only a very few export commodities whose production has been highly assisted. Like the small country assumption, this is less of a problem if estimates are made regularly and responses to policy changes are incorporated.

e) In the absence of assistance, prices of goods, services, and factors, represent their opportunity cost to the community	This implies that there are no price or quantity distortions in the domestic market other than those included in the analysis. If major sources of assistance are excluded from the effective rate measure, then judgments as to the relative levels of assistance between industries can be biased.
f) Production relationships between inputs (that is, intermediate inputs and primary factors) are unchanged by the structure of assistance	This can be a serious limitation, as high assistance to an activity is often provided to sustain existing operations so as to avoid the rationalization of an industry to a more appropriate role in the economy using more appropriate technology. It is also unrealistic to the extent that a high tariff on a particular material input is likely to cause users to substitute toward the greater use of alternative, less highly assisted, materials. Nevertheless, it does emphasize the cost of maintaining existing production relationships. Changes in the relationships are incorporated automatically if estimates are made regularly to monitor progress and databases are updated as part of that process.

Source: IC, 1995.

3.4. Main critiques

The literature on the ERP is much more extensive than the one on the ERA. However, as said before the ERP and ERA are based on the same type of methodological structure, therefore the critiques presented to one are also applied to the other.

One of the main critiques made to the effective rate of protection is the so called “substitution problem”.

Grunbel and Lloyd (1971) tried to access the nature and the magnitude of the bias in the calculation of ERPs when substitution between the inputs is neglected. They concluded that the upward bias is relatively small. According to them, theoretical work on factor substitution effects promises greater returns could yield better results than the one on general equilibrium effects. Substitution elasticities can be made, but even if one can point the fragility of such measurement, one could calculate the ERPs by assuming plausible values or ranges of values.

Sampson (1974) reviewed Grunbel and Llyon (1971) article and criticized it. He argued that their study, first, was based on a limited set of parameters values and that they did not qualify what would be a “relatively small bias”. He then concludes that the magnitude of the bias can be very significant as the rank of the ERP between industries can vary greatly with the biased estimations. According to him: “*These comments have significant implications for the notion that the elasticity of substitution is not an important parameter in calculating the ERP*".

What can be taken out of this is the fact that effective protection is a partial equilibrium concept. It measures the impact that protection policies on sectors inside an economy that compete for scarce resources. However, in general equilibrium “*prices of primary (non produced) factors are endogenous, and the prices of (internationally) non traded goods may change as well*” (ANTIMIANI et al., 2003). Therefore, the fundamental critique to ERP concept is based on concerns of drawing general equilibrium inferences from partial equilibrium measues. This is issue better discussed by Ethier (1971) and Bhagwati and Srinivasan (1973).

All those critiques and ideas are widely recognized today. But, according to a World Bank paper (VALDEZ, 1996), empirical studies tend to be ignored those biases as elasticities of substitution are “virtually impossible to obtain”. According to Bell (2007), the applied researcher is torn between simplicity and rigor. If rigor is the main objective, then the only reasonable solution is to undertake a full-scale general equilibrium analysis and, in this case, the ERP index becomes the “fifth wheel of the coach”. Anderson (1998) wrote that the ERP is the “ranch house of policy construction – ugly but apparently too useful to disappear”.

4. Methodology, calculations and results

The methodology used for the calculations of the Effective Rate of Assistance is based on the one used by the Australian Productivity Commission. This institution publishes periodically some reports on trade and assistance to the industries in that country by calculating the effective rate of assistance.

The annexes to this paper include the calculated results, the description of the calculations and the databases used. This chapter starts with the description of the main methodological choices. Then, it presents the results. Further, a sensitivity analysis is made to assess the impacts of those choices on the final result. Finally, some limitations of this research are listed.

4.1. Countries, products and period

As discussed before, in this study, four European countries were chosen to carry out the analysis: Germany, France, Spain and Sweden. Those are, respectively, the top three European producers of biofuels and a country that has being aiming for fossil fuel substitution for a longer period. The objective is to identify if the levels of protection in the countries that represent the most the European biofuel industry (top producers) and also compare if there are significant differences with a consuming country that has limited production (Sweden).

As stated several times, the main objective of an ERA calculation is to compare levels of protection in different steps of the production chain and, thus, be able to identify the direction of the limited resources' allocation in that economy. Therefore, this paper has selected the following products: ethanol, biodiesel, wheat, and rape. Those are the two main biofuels and the two main primary agricultural inputs used in European biofuel production.

Finally, 2006 is the selected year for analysis as it the most recent one for which it is possible to get the necessary data.

Those choices will allow not only a cross industry analysis, but also a cross country one. It could be important as, even though part of the European agricultural policy is defined in Brussels, a very important role is left for local governments in the case of biofuels policies.

It is acknowledged the fact that ethanol is classified as an agricultural product under the WTO Agriculture Agreement while biodiesel is not. It is not clear why each biofuel is classified differently[9]. Nevertheless, it is clear that biofuel production is an activity that differs very much from crop and oilseed harvesting. Therefore, in this study, the production of both biofuels is considered as an industrial activity. Also, just for simplicity, only the production of the feedstock (wheat and rapeseed) is referred to as an agricultural activity.

[9] For further information see: BRÜHWILER and HAUSER (2008), HOWSE et al. (2006) and JANK et al. (2007).

4.2. Point of measurement

To calculate the ERA one needs to choose an appropriate point in the production-to-consumption chain to measure the assistance. In this study, measurement has been made as far as possible at the farm-gate level (for feedstock products) and at the plant/industry level (for biofuels). In the case of inputs, costs are measured, whenever possible, on a cost to manufacturer basis.

The biofuels industry in this study includes the seed crushing plant, the actual biofuels producing industry and the blender. Assuming that a crushing plant is part of the industry poses no problem, as the same was made by the studies used as source for the production costs (DESBOIS & LEGRIS, 2007 and PREMIA, 2006). They consider the seeds, and not secondary products (such as the oils, molasses, etc), as the feedstock. Some may argue that the industry imports more oil than seed, but as the import tariffs on seeds and oils dedicated to biodiesel production are both equal to zero, the assistance on those inputs are also zero in either case. It does not matter each one is considered to be imported.

The assumption that biofuels producers are also the blenders is a more problematic one. It has to be made to include, in the calculation of the ERA for the biofuel industry, one of the most important policies of support: the excise tax exemption. This support is actually granted at the distributor/blender level. However, it is widely assumed that a great part of it is transferred to the producer. Later in this chapter a sensitivity analysis about this methodological choice is presented, showing that even if it can impact the ERA level, it does not change the ERA ranking.

4.3. Assisted value of outputs

The prices considered for the calculation of the value of the outputs does not include VAT, therefore there is no need to deduce those taxes from it.

However, as said before, biofuels enjoy important excise tax exemptions. Those are included in the calculations, given the assumption that the biofuel production industry would also be a blender one.

In the case of the feedstock, calculation of the support measures in a country specific and product specific level are much more complicated. A great part of the available data is at the Union level.

It is acknowledge that the decoupling of the payments made it impossible to identify the amount each agricultural product receives. Nevertheless, it is necessary to attribute some level of subsidy by product for the ERA calculations. An important part of the farmers' costs are still being supported, even with the new scheme. The non inclusion would result in a negative ERA (see section 4.7), which would be quite an awkward conclusion, as tariff on inputs are lower than on outputs and as there are direct payment schemes in place. To do it so, the average per hectare direct support each crop received in 2002 was calculated. It was then multiplied by the harvest area of each crop in 2006. One must recognize the limitations of such method but it was the only possible way. Also, as many of the crops have rotation periods of around 3 years, it is possible to assume that an important share of the farmers maintained the cultivation of the product they had in 2002.

In the case of the energy crop payments, the calculation is more straightforward. As data for 2006 is only available at a country aggregate level (it does not differ the aid to each crop), the share of the total support each crop received in each country in 2005 was applied to the total expenditures in 2006.

4.4. Value of inputs

The value added in an activity may be measured from the difference between the returns received from sales of goods and services and costs paid for intermediate inputs used to produce those goods and services (IC, 1995). In order to consider what is defined as inputs, this study follows the methodology used by Valdéz (1996) in a World Bank study. It considers only the main purchased inputs. In the case of the agricultural raw materials (wheat, rapeseed, etc) they include: seeds, fertilizers, plant and soil protection and operational costs, such as fuel. In the case of the biofuels it considers: the feedstock and operational costs.

An ideal way of treating tradable capital items in a given industry is to deduct its depreciation from value added. However, as capital depreciation data was not available for all the activities analyzed, following the methodology used by the IC (1995), it was opted to include depreciation of tradable capital as part of an activity's value added to maintain coherence. The same was made for the land use opportunity costs for the case of the feedstock products.

4.5. Tariffs on outputs and tax equivalent on inputs

Instead of considering the actual applied tariffs, this study uses the price gap between the national producer price and the international reference price in its calculations. The chosen prices for the calculations are the ones used for the Producer Support Estimations (PSE) done by the OECD. It is assumed that, by doing so, the real market price support derived from the tariff protection is better captured in the analysis. However, if published producer prices are lower then international reference price, then, tariff is assumed to be zero. Finally, only for aggregated items (e.g. operational costs, fertilizers, etc), an assumed ad valorem tariff was used.

4.6. Support measures not considered

Subsidies to value added and exchange rates regimes are not considered in the analysis. In the case of the subsidies to value added, it is justified by the lack of available data. The most important ones are usually subsidized grants for construction of plants or research projects, it is almost impossible to open them into a country/year/product basis.

The mandatory blends are not included in the assistance to biofuels. There were no relevant obligatory ones in force in 2006. Only France had a de facto, but not de juri, mandate as distributors had to pay a special tax (general tax on polluting activities), in addition to the usually applied on fuels, if they did not achieve the target of 1.75%. The fragility of the enforcement of that measure, the relative low level of the blend and the difficulties in quantifying the equivalent of the amount of support given justifies the exclusion.

Even though exchange rate regimes can have impacts on the level of protection of a given industry, its exclusion of the analysis is justified as it is not part of the biofuel and agricultural policies. Also, they are never included in empirical ERA calculations.

Finally, non tariff barriers could play an important role in the protection. It is the case, for example, of technical standards like the iodine content on biodiesel or the alcohol content in ethanol. Due to the difficulties of empirically estimating the tariff equivalents of such measures, it is opted here to not consider those in the calculations.

4.7. Sensitivity analysis of the methodological choices

In this section some sensitivity analysis is made to test the impacts of the methodological choices made. Changing those choices and checking the changes on the final calculated ERA will allow identifying the ones that could have been problematic and that could, potentially, have impacts on the final conclusions.

To compare the changes, a scale of ERA was developed based on a band system (Table 4). This section will analyze if product's ERAs will move from one band to the other as the methodology of calculation changes.

Distribution of the excise tax exemption

As said before, this study assumes that the biofuel industry absorbs the totality of the excise tax exemptions granted by stating that producers are also blenders. As pointed, it is a problematic choice as the exemptions are actually granted to the blenders and many times those are in different steps of the production chain. Empirical studies about effective protection always have the problem of who is capturing the subsidy. The more you divide the production chain, the harder it is to do so (as one link of the chain is closer to the other, higher is the possibility that part of the support might be transferred). This is the case in this study.

Therefore, to analyze the impacts of such assumption, first the assumption is changed by assuming that the producer's would get only 50% of the total exemption. It does not change the magnitude of the calculated ERA for ethanol, for all the countries it remains above 200%. Even if the whole tax exemption is excluded form the industry, it still remains at levels above that mark. For biodiesel it is different. It is possible to see that the assumption of the excise tax distribution can impact the band of the ERA. In all countries it descended one band, only in Sweden, it stayed on the top one. In all the cases, except in Spain, it remained above the levels of the agricultural commodities, therefore, not altering the ERA rank.

The second test is to assume that biofuel producers would receive some of that support and the agricultural producers would also touch part of it. It is assumed a share of 30% for each (assuming that the gasoline industry would get the rest).

As a consequence, it is possible to conclude that the assumption made on the calculations (that the totality of the excise tax is captured by the biofuel producers) do not have major impacts on the final ERA rankings and on the conclusions of this paper. On the other hand, one has to bear in mind that gap and, therefore, the strength of the relative protection could change.

Relevance of the decoupled direct payments in agriculture

The final sensitivity analysis is made on the methodology of distribution of the CAP's decoupled payments to crops. In this case, the choice has major impacts on the final ERA. For almost all the commodities a positive ERA that varied between 17% and 52% for those products become negative ones, varying between 11% and -24%.

As a conclusion, the choice of including the SFP on the calculations does have major impacts on the level of the ERAs. If they are not included, almost all the ERAs become negative. It would mean that the returns earned through the agricultural activity with intervention in place are lower than they would be without them. It would be quite surprising to conclude that European agricultural producers are worst off with the current system of support than they would be without it. Therefore, even though the attribution of the SFP to specific commodities can be criticized, it appears to be necessary to do so, justifying the choice made in this study.

Finally, it is important to point out that even though the issues discussed here could change considerably the level of the calculated ERAs, it would not change the inter industry rank.

The biofuel industry in all analyzed countries would remain more protected than the agricultural one.

Tariffs on outputs and tax equivalent on inputs

In the calculations presented, this study chose to use the differential between the local price and an international reference one as a measure of the tariff protection. If the international prices are higher than national ones, the tariff is just assumed to be zero. However this analysis can be made taking into account the actual notified tariffs instead of the price differential.

To assess the sensitivity of that choice, the ERA was recalculated considering the notified tariff if the EU was a net importer and zero if the EU was a net exporter in 2006[10]. This is made not only for the outputs, but also for the agricultural inputs in the case of biofuels.

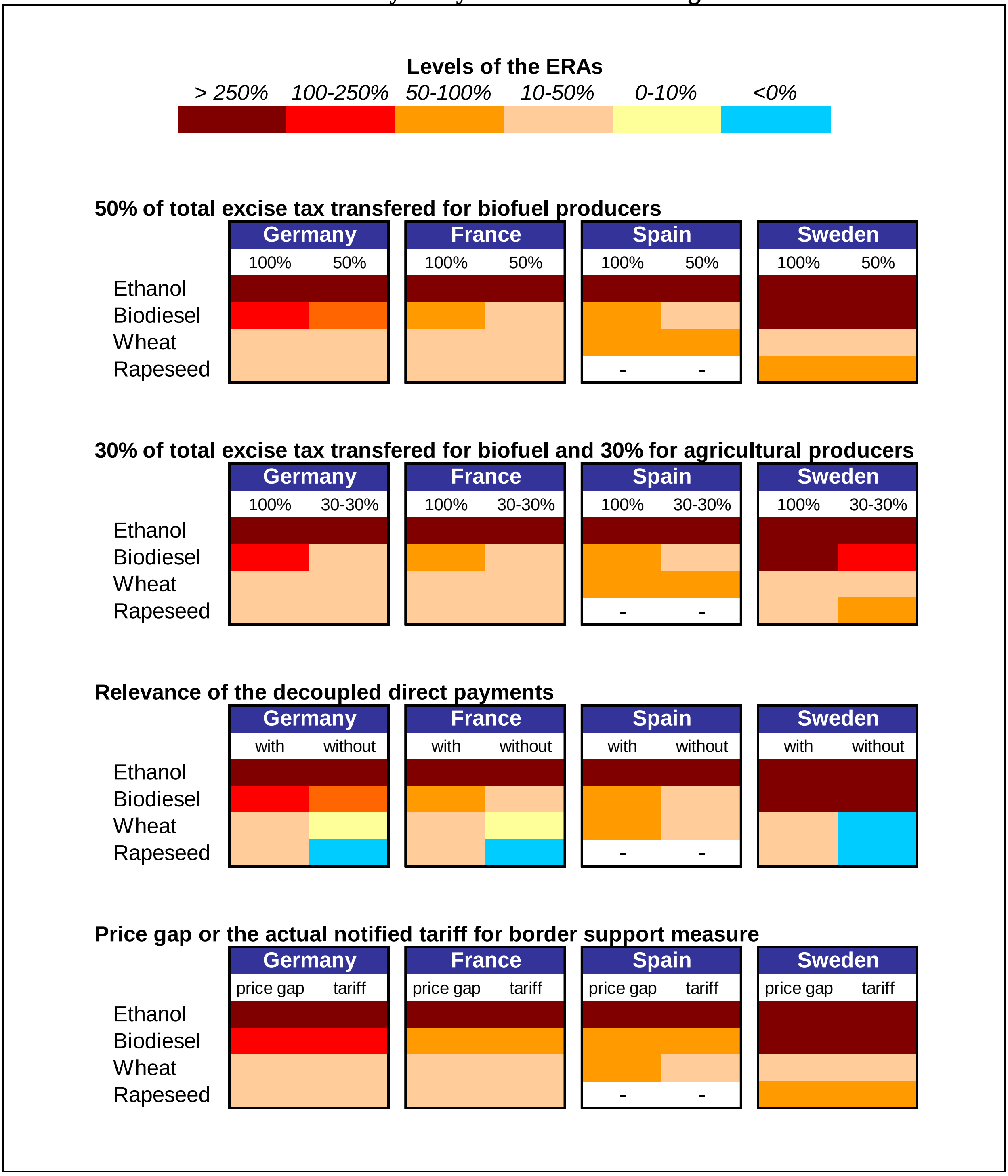
The impacts of that change in the methodology on the calculated ERAs for biofuels are quite small. For biodiesel, it does not change (even though some claim that the EU imports B99 from the US, it cannot be considered yet as an importer). The support to input does not change either, as every imported feedstock for industrial use enjoys a zero tariff. For ethanol the tariff on output does not change, as the price gap is exactly equal to the import tariff. The differences in the input tariffs are not enough to change the band of the ERA. In the case of the feedstock, only wheat in Spain drops a level.

As a conclusion, it is plausible to argument that the choices of the measurement of the border protection made in this study do not have major impacts on the results of the resource allocation within the industries.

By analyzing the graph and the arguments presented, it is possible to conclude that the methodological choices made in this study may impact the level of the Effective Rate of Assistance in some cases. However, the ranking within the industries appear to remain the same in almost all the cases. The choices prove to be consistent.

[10] Here, even though some countries could be net importers or net exporters, it is necessary to consider the EU as a whole as intra trade is not subject to the border protection.

Table 4 - Sensitivity analysis of the methodological choices



4.8. Results

Table 5 resumes the calculated results[11]. As it is possible to see, the biofuel industry is the most protected in every single one of the countries. Ethanol has in all these countries the highest level of protection, more than 250%. It is important to point out that those results do not consider the equivalent support of the mandatory targets that are being put in place as there were no relevant obligatory ones in 2006. It will potentially boost even more the ERA for biofuels. Another important thing to point out is the importance of the tariff barriers on the output. In most of the cases, ethanol's protection is the highest due to its tariff. It is playing a more important role in the level of the ERA than the other support measures. The biodiesel tariff was assumed to be zero (as there is no international reference price, nor important biodiesel trade flows outside the EU). However, as other countries develop and an international market is created, setting a price for biodiesel, the ERA could increase if that price is lower than the EU one. In the case of biodiesel it is the excise duty the one sustaining the high level of the ERA.

Table 5 - Effective Rate of Assistance for Selected countries - 2006

Industry comparison

rank	Germany		France		Spain		Sweden	
1st	Ethanol	>250%	Ethanol	>250%	Ethanol	>250%	Ethanol	>250%
2nd	Biodiesel	149%	Biodiesel	95%	Biodiesel	69%	Biodiesel	>250%
3rd	Wheat	25%	Rapeseed	50%	Wheat	52%	Rapeseed	53%
4th	Rapeseed	24%	Wheat	32%			Wheat	33%

Country comparison

rank	Ethanol		Biodiesel		Wheat		Rapeseed	
1st	Germany	>250%	Sweden	>250%	Spain	52%	Sweden	53%
2nd	France	>250%	Germany	149%	Sweden	33%	France	50%
3rd	Spain	>250%	France	95%	France	32%	Germany	24%
4th	Sweden	>250%	Spain	69%	Germany	25%		

The protection for agricultural products remains in lower levels when compared to the biofuel industry. As the difference between the ERAs is very relevant, the protection for the industry is much more impressive than the one to the agriculture. It is important to point out, however, that the level of the ERA is not low for the agriculture. It is over 20% in all the countries. Rapeseed appears to enjoy a higher level than wheat. However, as pointed in the sensitivity analysis, the wheat notified tariff is higher than the one for rape. Therefore, a drop in the

[11] For further information see the Annexes.

international prices could boost the ERA for wheat. It is probable; however, that it will never be much higher than the European prices as Europe is an important exporter.

Also, a cross country analysis is possible. In this case, the results are not as clear as in the cross industry analysis, since the differences in the ERA are much less important. For ethanol, all the countries have ERA’s over 250%. It is not possible to identify the ones that are protecting it the most. In biodiesel, the ranking is clearer. Sweden has the highest support; it is the only case that the value of the excise tax exemptions surpasses the total production value of biodiesel in the country. It is in part explained by the low level of production in Sweden. In the case of Germany, the second in the rank with a support of almost 150%, the situation is more consolidated. The country is the top producer, so the impacts of its level of protection are much higher.

For the feedstock, the levels of the ERA between the countries do not vary as much. It was expected as the CAP is defined on the European level, countries do not have the same space of maneuver and the level of support tends to be more alike. Even if, for example, in the case of rapeseed, German producers have half of the French assistance, the methodological choices may impact those levels, reducing the difference, as discussed in the sensitivity analysis.

4.9. Limitations of the research

Database

Given that there is no data available for biofuels production by feedstock by country, calculation had to be made based on current installed capacity. It does not, necessarily, represent the actual share in production. In Sweden, for example, there is some capacity for ethanol production from sugar beet, but in practice, it is not used. Because of the lack of similar information in all the countries, and to maintain the methodological rigor, all the percentages were based on installed capacity.

Due to availability, the sources for production costs are different. An important effort was made to consider only the same input costs for all products. However, some differences in methodology in each of those sources could still remain. Also, the costs on feedstock were available only on the European level in an area basis. As described, to transform them into country per ton costs, the specific yields were used. As Germany and Spain have very high yields, in wheat for example, the costs per ton become much lower causing the materials to output ratio to low. This has an impact on the estimated value added (i.e. too high) and in the ERA estimate (too low).

Also, the farm gate prices and input costs for 2006 are not all available for all the selected countries. In some cases, older nominal prices had to be updated with available indexes (e.g Eurostat input indexes, Eurostat farm gate prices indexes). Sometimes prices and costs from one country had to be applied to others as well.

Methodology

First, the estimations do not aim to capture all the support measures for agricultural and biofuels production in Europe, but only the main ones.

As discussed, the distribution of the decoupled payments to specific agricultural products can be complicated as those payments are not linked to specific products nor production. This limitation has to be acknowledged.

In addition, the more the industry is divided in an ERA analysis, the greater is the risk that one form of support would be transferred down the production chain.

Also, quantification constraints and data availability limit the precision of some of the estimations. Care is needed when drawing inferences from the numbers presented here.

Further to that, as discussed above, there are a few problems with some of the general assumptions of ERA in the biofuels case. The first one is the *small country assumption.* On the case of biofuels it is hard to imagine that the world supply is infinitely elastic. On the agricultural side, EU exports and imports could change international prices. The second one is the *substitution problem*. It is hard to define the input coefficients on the final product, feedstock used can be substituted depending on the installed capacity. It has impacts on the calculation of the support to inputs. But, as seen in the sensitivity analysis section, this is not the main driver of the high ERA for biofuels. Still, as stated before, the violation of those assumptions does not necessarily invalidate the measure for comparative purposes (IC, 1995).

Finally, comparisons of effective rates provide information in a static framework. Therefore, a complete evaluation of the impact of such variations in the incentives for producers and on the allocation of the community's resources goes well beyond the simple effective rate measure. To do so, one would need to consider that changes in assistance also alter production and consumption decisions. Therefore, to compare the levels of effective assistance between industries is a simple and effective way to indicate relative incentives due to government intervention. However, caution is required when drawing conclusions about real allocation of resources (IC, 1995). The ERA is a "picture" of the policy implications in a country's industry in a given moment in time. Also, as noted before, the nominal value of the ERA should not be used by itself, since it does not allow many conclusions. An inter industry or cross country comparison is always needed bearing in mind that only significant differences in ERAs can be used for policy suggestions.

This study tried to minimize the best as possible its limitations. The sensitivity analysis, the comparison approach, the work on the available data, all that reduced to feasibly calculated and reasonably trusted index and rank. Care was taken in all the conclusions to consider the potential limits.

Concluding remarks, policy recommendations and indication of future research

This work tried to indicate the direction in which resources will be pulled in the biofuels chain due to the current European biofuel policy. The comparison between the calculated ERA in different steps of the biofuel production chain allows the conclusion that the biofuel industry is being much more protected in relative terms than the agricultural producers in Europe. One of the declared objectives of the current biofuel policy is to support agriculture after the important policy reforms on the CAP. The study shows that agriculture continues to receive very important assistance in the EU (with ERA's ranging between 25 and 50%), however, it points out that the way the current policy is made is benefiting extremely more the biofuel industry. Those conclusions can indicate policy makers that the current support scheme for biofuels is not, potentially, the best one available for one of the main objectives the commission is imposing.

The support scheme is extremely costly for the European governments. The excise duties are a major part of the cost of that support. In the biodiesel case, it is the measure allowing the high levels of ERA. It is mainly due to the fact that there is no international market for that biofuel. As a consequence, the EU border protection is having no impact on the level of assistance in this study. However, as other countries engage in biodiesel production, it will become more relevant. Moreover, there are also the impacts of technical barriers (e.g. iodine content on biodiesel). They were not considered in this study but potentially protect an industry that enjoys an extremely high level of assistance even without them. As a consequence, without considering the technical justifications of such measures, those barriers could be excluded and the industry would still be highly protected.

In the case of ethanol, on the other hand, the tariff barriers are very important. As a consequence, if one is concerned only with the cost for tax payers, the excise duty for ethanol could be condensed, reducing the budgetary pressure while maintaining high levels of support. Even with zero tax exemption, only the tariff barrier is enough to maintain the ERA level for ethanol above 250% in all countries. The forthcoming obligatory consumption targets enforce even more that argument. Again, the technical barriers (e.g. alcohol content) could be pushing even higher the border protection and appear not to be needed.

For the feedstock, the decoupled payments are, by far, the most important part of the support. As discussed, due to the proximity between the agricultural producers and the biofuel industry in the production chain, part of the tax exemptions for biofuels could be being transferred down to producers. Even in the analyzed case where farmers would get 30% of all the excise tax exemption, the level of protection in agriculture remains relatively stable. It does not seem that it is the best way to support farmers. The border protection for the two analyzed commodities does not play major roles either. For rapeseed it is zero. For wheat it is very high, but as the EU is a net exporter, it does not have major impacts. The tariff for wheat could be then reduced.

This paper analysed only a limited number of products, countries and measures. As discussed, the calculation of the Effective Rate of Assistance for biofuels in Europe has never been made. This study expects to be the first step. For further analysis, other products have to be included, such as barley, soybeans, sunflower seed and, mainly, sugar beet, as it is becoming an important feedstock. This is specially the case in France. Also, further decomposition of the production chain could be interesting. For example, to include the vegetable oil industry and the fossil fuel one. But to do so correctly, a deeper analysis of the potential transfer of the support between the steps of the production chain becomes even more significant. That type of investigation would also be positive for determining the real impacts of the excise tax exemption on the biodiesel ERA because, as discussed, it is a very important measure defining its level of assistance. Furthermore, the calculation of the ERA gives us a “snap shot” of the current policy. Therefore, periodical calculations, considering other years, could be interesting in defining the evolution of a support scheme. The introduction of the equivalent support of the mandatory blends will be very important in coming years. Finally, other countries could be introduced, expanding the study to other continents. That would allow a better cross country analysis, including other main players. It could be used as an important asset in international trade negotiations within that sector.

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List of acronyms

B100 – Pure biodiesel

CAP – Common Agriculture Policy of the European Union

HS – Harmonized System

E85 – Blend of 85% ethanol and 15% gasoline

ERA – Effective rate of assistance

ERP – Effective rate of protection

EU – European Union

FFVs – Flex fuel vehicles

MFN – Most favored nation

NRP – Nominal rate of protection

SFP – Single farm payments

US – United States

ANNEX 1 – ERA calculations

Million euros - 2006

ETHANOL		Germany	France	Spain	Sweden	Calculation	Notes	Sources
OUTPUTS								
	Production Value	260	193	261	47	Production * producer prices	Taxes are not included in the prices.	Eurobserv'er (2007), Eurostat and OECD.
	Tax exemptions	395	113	84	176	Calculations made by the Global Subsidy Initiative		Kutas et al. (2007).
	Distilation measures	10	-	28	6	(estimated production from wine in each country) * 0.23	0.13 euros per liter of wine as aid for distillers and 0.11 per liter as aid for storage and disposal.	Author's estimations based on Ebio and Kutas et al. (2007).
	Subsidy equivalent of the mandatory blends	-	-	-	-	Not included.	In 2006 there were no relevant mandatory targets (only france had a "de facto", but not "de juri", mandatory target of 1.75%).	
AP	**Assisted value of output**	**665**	**306**	**373**	**229**	somme of the above		
	Feedstock costs	145	108	146	27	(Feedstock costs) * production.		
	Operational costs	21	16	22	4	(Operational costs) * production.		
AM	**Value of inputs**	**167**	**124**	**167**	**30**	somme of the above	Feedstock costs were updated comparing assumed agricultural prices in the orginal source with 2006 ones.	PREMIA (2006), EurObserv'er (2007) and Eurostat.
AVA	**Assisted value added to output**	**498**	**182**	**206**	**199**	AP - AM + SVA		
ASSISTANCE TO OUTPUTS								
TO	**Tariff of output**	**76**	**56**	**76**	**14**	(International reference price - national producer price) * production		Eurobserv'er (2007) and Kutas et al. (2007).
	Tax exemptions	395	113	84	176			
	Distilation measures	10	-	28	6			
	Subsidy equivalent of the mandatory blends	-	-	-	-			
GSE	**Gross subsidy equivalent**	**481**	**169**	**188**	**195**	AP + TO		
UP	**Unassisted Value of Outputs**	**184**	**136**	**185**	**34**	AP - GSE		
NRA	**Nominal rate of assistance on outputs**	**261%**	**124%**	**102%**	**583%**	GSE / UP		
ASSISTANCE TO INPUTS								
	Tariff on feedstock: maize	1	-	-	-	(% of maize in total feedstock use) * (total feedstock cost) * [(International reference price - national producer price)/International reference price]		PREMIA (2006), Eurostat and OECD.
	Tariffs on feedstock: beet	-	-	-	-	zero	As beet is a non tradable input, its tariff is assumed to be zero.	
	Tariffs on feedstock: cereals	-	-	-	-	zero	If published producer prices are lower then International reference price, then, tariff is assumed to be zero.	PREMIA (2006), Eurostat and OECD.
	Tariffs on operational costs	1	0	1	0	Operational costs * 2.9%	2.9% is the average EU NAMA tariff ponderated by trade.	PREMIA(2006) and WTO (2007).
TEM	**Tax equivalent on inputs**	**2**	**0**	**1**	**0**	somme of the above		
UM	**Unassisted value of inputs**	**165**	**123**	**167**	**30**	AM - TEM		
NRM	**Nominal rate of assistance on inputs**	**1%**	**0%**	**0%**	**0%**	TEM / UM		
VALUE ADDED ASSISTANCE								
SVA	**Subsidy to value added**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	Not avaiable.	There are grants for biofuel plants but no avaiable data for a calculation by year.	
UVA	**Unassisted value added**	**19**	**13**	**18**	**3**	UP - UM		
NSE	**Net subsidy equivalent**	**479**	**169**	**188**	**195**	AVA - UVA + SVA		
ERA	**Efective rate of assistance**	**>250%**	**>250%**	**>250%**	**>250%**	NSE / UVA		

Million euros - 2006

	BIODIESEL	Germany	France	Spain	Sweden	Calculation	Notes	Sources
OUTPUTS								
	Production Value	2 678	748	100	13	Production * producer prices	Taxes are not included in the prices.	Eurobserv'er (2007), Eurostat and OECD.
	Tax exemptions	1 239	222	21	25	Calculations made by the Global Subsidy Initiative		Kutas et al. (2007).
	Subsidy equivalent of the mandatory blends	-	-	-	-	Not included.	In 2006 there were no relevant mandatory targets (only France had a "de facto", but not "de juri", mandatory target of 1.75%).	
AP	**Assisted value of output**	**3 917**	**969**	**121**	**38**	somme of the above		
	Feedstock costs	1 618	452	60	8	(Feedstock costs) * production.		
	Alcohol costs	112	31	4	1	(Alcohol costs) * production.	Besides the feedstock directly used, biodiesel production uses alcohol (usually in a 10% proportion) as a catalyser in the transesterification process.	
	Operational costs	137	38	5	1	(Operational costs) * production.		
AM	**Value of inputs**	**1 866**	**521**	**69**	**9**	somme of the above	Feedstock costs were updated comparing assumed agricultural prices in the orginal source with 2006 ones.	PREMIA (2006), EurObserv'er (2007) and Eurostat.
AVA	**Assisted value added to output**	**2 051**	**448**	**52**	**29**	AP - AM + SVA		
ASSISTANCE TO OUTPUTS								
TO	**Tariff of output**	**-**	**-**	**-**	**-**		Tariff on biodiesel in the EU is 6.5%. However, there is no relevant international trade of biodiesel nor a consolidated international price. Germany's price (biggest world producer) is assumed as the international one, therefore, the price gap is zero.	
	Tax exemptions	1 239	222	21	25			
	Subsidy equivalent of the mandatory blends	-	-	-	-			
GSE	**Gross subsidy equivalent**	**1 239**	**222**	**21**	**25**	AP + TO		
UP	**Unassisted Value of Outputs**	**2 678**	**748**	**100**	**13**	AP - GSE		
NRA	**Nominal rate of assistance on outputs**	**46%**	**30%**	**22%**	**193%**	GSE / UP		
ASSISTANCE TO INPUTS								
	Tariffs on feedstock	-	-	-	-	Feedstock costs * 0%	All feedstock (seeds and oil) imported for biodiesel production enjoy a zero tariff.	
	Tariffs on alcohol	6	2	0	0	Alcohol costs * 5.5%	5.5% is the EU tariff for methanol.	TARIC
	Tariffs on operational costs	4	1	0	0	Operational costs * 2.9%	2.9% is the average EU NAMA tariff ponderated by trade.	PREMIA(2006) and WTO (2007).
TEM	**Tax equivalent on inputs**	**10**	**3**	**0**	**0**	Some of the assistance on inputs		
UM	**Unassisted value of inputs**	**1 856**	**518**	**69**	**9**	AM - TEM		
NRM	**Nominal rate of assistance on inputs**	**1%**	**1%**	**1%**	**1%**	TEM / UM		
VALUE ADDED ASSISTANCE								
SVA	**Subsidy to value added**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	Not included.	There are grants for biofuel plants but no avaiable data for a calculation by year.	
UVA	**Unassisted value added**	**822**	**229**	**31**	**4**	UP - UM		
NSE	**Net subsidy equivalent**	**1 228**	**219**	**21**	**25**	AVA - UVA + SVA		
ERA	**Efective rate of assistance**	**149%**	**95%**	**69%**	**>250%**	NSE / UVA		

Million euros - 2006

	COMMON WHEAT	Germany	France	Spain	Sweden	Calculation	Notes	Sources
OUTPUTS								
	Production Value	2 450	3 988	559	221	Production * producer prices		
	Energy crop payments	1	0	0	0		2005 share of wheat on the payement expenditures applied to 2006 total expenditures values	European Commission
	Subsidies to production	605	1 247	148	49	(per hectare average of subsidies for cereals in 2002-03) * (2006 wheat harvested area).	It is acknowledge that an important part of the current payments are decoupled (France and Spain still maintain it partially coupled). However, it is necessary to attribute some level of subsidy by product for the ERA calculations. Part of the farmer cost	Author's calculations based on European Commission and Eurostat data.
AP	**Assisted value of output**	**3 056**	**5 235**	**708**	**270**	somme of the above		
	Seeds costs	-	-	-	-			
	Fertilizers costs	20	22	51	27			
	Plant protection costs	26	27	65	34	(costs by hectare / yields) * production.	Original European 2004 costs (euros/ha) were updated with the Eurostat agricultural input indexes. They were then converted in individual euro/ton costs with the 2006 yields in each country.	DESBOIS and LEGRIS (2007), Eurobserv'er (2007) and Eurostat.
	Petrol products costs	7	8	18	10			
	Others specific costs	10	11	26	14			
AM	**Value of inputs**	**63**	**68**	**161**	**84**			
AVA	**Assisted value added to output**	**2 992**	**5 167**	**547**	**186**	AP - AM + SVA		
ASSISTANCE TO OUTPUTS								
TO	**Tariff of output**	**-**	**-**	**43**	**-**	(International reference price - national producer price) * production for Spain. Zero for the others.	If published producer prices are lower then International reference price, then, tariff is assumed to be zero.	Eurostat and OECD.
GSE	**Gross subsidy equivalent**	**606**	**1 247**	**192**	**49**	AP + TO		
UP	**Unassisted Value of Outputs**	**2 450**	**3 988**	**516**	**221**	AP - GSE		
NRA	**Nominal rate of assistance on outputs**	**25%**	**31%**	**37%**	**22%**	GSE / UP		
ASSISTANCE TO INPUTS								
	Tariffs on Seeds	-	-	-	-	zero		
	Tariffs on Fertilizers	1	1	1	1			
	Tariffs on Plant protection	1	1	2	1	costs * 2.9%		
	Tariffs on Petrol products	0	0	1	0		2.9% is the average EU NAMA tariff ponderated by trade.	WTO (2007).
	Tariffs on Others specific costs	0	0	1	0			
TEM	**Tax equivalent on inputs**	**2**	**2**	**5**	**2**	somme of the above		
UM	**Unassisted value of inputs**	**62**	**66**	**156**	**81**	AM - TEM		
NRM	**Nominal rate of assistance on inputs**	**3%**	**3%**	**3%**	**3%**	TEM / UM		
VALUE ADDED ASSISTANCE								
SVA	**Subsidy to value added**	**n.a.**	**n.a.**	**n.a.**	**n.a.**	Not included.		
UVA	**Unassisted value added**	**2 389**	**3 922**	**360**	**140**	UP - UM		
NSE	**Net subsidy equivalent**	**604**	**1 245**	**187**	**47**	AVA - UVA + SVA		
ERA	**Efective rate of assistance**	**25%**	**32%**	**52%**	**33%**	NSE / UVA		

Million euros - 2006

RAPESEED		Germany	France	Spain	Sweden	Calculation	Notes	Sources
OUTPUTS								
	Production Value	1 254	914		52	Production * producer prices		
	Energy crop payments	5	6		0		2005 share of rapessed on the payement expenditures applied to 2006 total expenditures values	European Commission
	Subsidies to production	191	222		11	(per hectare average of subsidies for oiseeds in 2002-03) * (2006 wheat harvested area).	It is acknowledge that an important part of the current payments are decoupled (France and Spain still maintain it partially coupled). However, it is necessary to attribute some level of subsidy by product for the ERA calculations. Part of the farmer cost	Author's calculations based on European Commission and Eurostat data.
AP	**Assisted value of output**	**1 449**	**1 141**		**63**	somme of the above		
	Seeds costs	-	-		-			
	Fertilizers costs	261	257		17			
	Plant protection costs	223	220		14	(costs by hectare / yields) * production.	Original European 2004 costs (euros/ha) were updated with the Eurostat agricultural input indexes. They were then converted in individual euro/ton costs with the 2006 yields in each country.	DESBOIS and LEGRIS (2007), EurobservEr (2007) and Eurostat.
	Petrol products costs	71	70		4			
	Others specific costs	(40)	(40)		(3)			
AM	**Value of inputs**	**515**	**507**		**33**	somme of the above		
AVA	**Assisted value added to output**	**934**	**634**		**31**	AP - AM + SVA		
ASSISTANCE TO OUTPUTS								
TO	**Tariff of output**	**-**	**-**		**-**	(International reference price - national producer price) * production for Spain. Zero for the others.	If published producer prices are lower then International reference price, then, tariff is assumed to be zero.	Eurostat and OECD.
GSE	**Gross subsidy equivalent**	**196**	**228**		**12**	AP + TO		
UP	**Unassisted Value of Outputs**	**1 254**	**914**	*Production is irrelevant*	**52**	AP - GSE		
NRA	**Nominal rate of assistance on outputs**	**16%**	**25%**		**22%**	GSE / UP		
ASSISTANCE TO INPUTS								
	Tariffs on Seeds	-	-		-			
	Tariffs on Fertilizers	8	7		0			
	Tariffs on Plant protection	6	6		0			
	Tariffs on Petrol products	2	2		0	costs * 2.9%	2.9% is the average EU NAMA tariff ponderated by trade.	WTO (2007).
	Tariffs on Others specific costs	(1)	(1)		(0)			
TEM	**Tax equivalent on inputs**	**15**	**15**		**1**			
UM	**Unassisted value of inputs**	**500**	**492**		**32**	AM - TEM		
NRM	**Nominal rate of assistance on inputs**	**3%**	**3%**		**3%**	TEM / UM		
VALUE ADDED ASSISTANCE								
SVA	**Subsidy to value added**	**n.a.**	**n.a.**		**n.a.**	Not included.		
UVA	**Unassisted value added**	**753**	**422**		**20**	UP - UM		
NSE	**Net subsidy equivalent**	**181**	**213**		**11**	AVA - UVA + SVA		
ERA	**Efective rate of assistance**	**24%**	**50%**		**53%**	NSE / UVA		

ANNEX 2 – Statistical databases

General Data

	Value of output (million euros)				Production (million liters or million tons)				Local prices (farm gate) (€/l or €/ton)				International Prices (€/l or €/ton)
	DE	FR	ES	SE	DE	FR	ES	SE	DE	FR	ES	SE	Int.
Ethanol	260	193	261	47	400	297	401	73	0.65	0.65	0.65	0.65	0.46
Biodiesel	2 678	748	100	13	3 727	1 040	139	18	0.72	0.72	0.72	0.72	0.72
Beet	813	1 040	245	84	20.6	29.9	6.0	2.2	39	35	41	38	n.a.
Wheat	2 450	3 988	559	221	22.4	33.3	4.0	2.0	110	120	140	112	129
Rape	1 254	914	2	52	5.3	4.1	0.0	0.2	235	220	208	235	250
Sunflower	-	270	134	-	0.1	1.4	0.6	-	-	188	221	-	241

Sources: EBB, Ebio, Eurobserv'ER (2007), Eurostat, FAO, Kutas et al. (2007), OECD, UFOP.

Tariffs in the EU

Ethanol	**0.192** *Euros/liter*
Biodiesel	**6.5%**
Corn	**94** *Euros/ton*
Beet*	**0** *Euros/ton*
Wheat	**95** *Euros/ton*
Barley	**93** *Euros/ton*
Rape and Sunflower**	**0** *Euros/ton*
Rape oil and Sunflower oil**	**0** *Euros/ton*
Average European NAMA tariff***	**2.9%**
Average European AG tariff***	**12.3%**
Methanol	**5.50%**
Common wheat seed	**0** *Euros/ton*
Maize seed	**53** *Euros/ton*
Barley seed	**93** *Euros/ton*

Sources: TARIC, WTO (2007) and KUTAS et al. (2007)

Notes: * It is actually 67, but here it is consider zero one as beet is non tradable (due to extremely high transportation costs);

** For biodiesel production, *** Trade weighted average.

EU biofuel production costs 2006 (Euros/liter)

	Ethanol	Biodiesel
Feedstock	0.36	0.43
Capital costs	0.10	0.03
Operational costs	0.05	0.04
Alcohol	0.00	0.03
Total input costs	0.51	0.53

Sources: PREMIA (2006)

Note: Feedstock costs were updated comparing assumed agricultural prices in the original source with 2006 ones.

Feedstock production costs 2006 (Euros/ton)

Wheat				
	DE	FR	ES	SE
Specific cost	63.4	67.7	160.7	83.6
Seeds	0.0	0.0	0.0	0.0
Fertilizers	20.2	21.6	51.3	26.7
Plant protection	25.7	27.4	65.1	33.8
Petrol products	7.2	7.7	18.3	9.5
Others specific costs	10.3	11.0	26.0	13.5
Structural costs	10.6	12.2	5.2	9.3
TOTAL COSTS*	74.0	79.9	165.9	92.9
Rape				
	DE	FR	ES	SE
Specific cost	96.6	122.3	228.4	148.1
Seeds	0.0	0.0	0.0	0.0
Fertilizers	49.0	62.1	115.9	75.1
Plant protection	41.8	53.0	98.9	64.1
Petrol products	13.3	16.8	31.4	20.3
Others specific costs	-7.5	-9.5	-17.8	-11.5
Structural costs	135.9	172.1	321.3	208.4
TOTAL COSTS*	232.4	294.4	549.7	356.5

Sources: DESBOIS and LEGRIS (2007)

Note: Original European 2004 costs (euros/ha) were updated with the Eurostat agricultural input indexes. They were then converted in individual euro/ton costs with the 2006 yields in each country. * Without work. Seeds could have negative values, if they do, they are included in other specific costs.

ANNEX 3 – Summary of the ERA measurement of assistance

IC (Australian Industry Commission). 1995. Assistance to Agricultural and Manufacturing Industries. Canberra: Australian Government Publishing services, pgs 45-9.

Measurement of assistance

For measurement purposes, it is convenient to summarise the various forms of assistance into three groups on the basis of their effects on output returns, intermediate input costs and value added. Separate measures have been developed for each (see separate boxes).

Box A1.1: Output assistance

The output assistance provided by Government interventions is the increase in the gross returns from production above that which would apply in the absence of assistance. The gross return from production with assistance is called the assisted value of production (AP). The (hypothetical) gross return from that production without assistance is called the unassisted value of production (UP). The increase in the gross returns is called the gross subsidy equivalent (GSE). It is the notional amount of money that would give the same amount of assistance to gross returns as is provided by the existing government interventions.

$$GSE = AP - UP$$

The Nominal Rate of Assistance on outputs (NRA) is the percentage increase in gross returns per unit of output, relative to the (hypothetical) situation of no assistance.

$$NRA = (GSE/UP) * 100$$

Some interventions assist by raising prices (for example, tariffs), while others increase returns without increasing prices (for example, production subsidies).

Box A1.2: Intermediate input assistance

Intermediate inputs are a cost of production. Government interventions, such as tariffs, typically raise these costs. The cost of intermediate inputs with assistance is called the assisted value of intermediate inputs (AM). The (hypothetical) cost of those intermediate inputs without assistance is called the unassisted value of intermediate inputs (UM). The increase in the cost of intermediate inputs is called the tax equivalent on intermediate inputs (TEM), or sometimes just tax on materials. It is the notional amount of tax that would increase the cost of intermediate inputs by the same amount as the existing government interventions.

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Box A1.2: Continued

TEM = AM – UM

The Nominal Rate of assistance on intermediate inputs (or materials) (NRM) is the percentage increase in the cost of intermediate inputs per unit of input relative to the (hypothetical) situation of no assistance.

NRM= (TEM/UM) * 100

Some interventions raise the price of intermediate inputs (for example, tariffs) and some lower their cost (for example, subsidies to users). Measures which assist the production of intermediate inputs without altering their price to user industries (for example, production subsidies) are not included.

Box A1.3: Value added assistance

The assistance effects of government interventions that directly and specifically target land, labour or capital returns in particular activities may be measured as the notional amount of money, or subsidy equivalent, necessary to yield the same increase in returns to the land, labour or capital used in the activity or industry, as is provided by the assistance. This is called the Subsidy to Value Adding Factors (SVA). Interventions that apply generally to the use of resources throughout an economy (for example, income and value added taxes) are not included.

Box A1.4: Net assistance and the effective rate of assistance

The net assistance effect of government interventions on the use of resources in an activity, or industry, may be measured by the notional amount of money, or subsidy equivalent, necessary to provide the same increase in returns to value adding factors as is provided by the existing structure of assistance. The return to value adding factors, including the effect of assistance, is called the assisted value added (AVA). The (hypothetical) return to those value adding factors without assistance is called the unassisted value added (UVA). The increase in returns to value adding factors is called the Net Subsidy Equivalent (NSE) and may be derived by adding up output assistance and value added assistance, and subtracting the tax from intermediate input assistance.

NSE = AVA – UVA or

= GSE – TEM + SVA

Box A1.4: Continued

The Effective Rate of Assistance (ERA) is the percentage increase in returns, to an activity's, or industry's, value added per unit of output, relative to the (hypothetical) situation of no assistance.

$$ERA = (NSE/UVA) * 100$$

The net incentive effect of all forms of intervention on the use of resources in a particular activity is indicated by adding up their assistance effects. This net assistance is known as the Net Subsidy Equivalent (NSE) because, in principle in the absence of assistance, it is the amount of subsidy that would have to be paid to value-adding factors to provide them with the same returns as currently provided by the existing structure of industry assistance. Subsidy equivalents, including the NSE, depend on the size of the industry as well as the rate of assistance. The effective rate of assistance (ERA) expresses the NSE as a percentage of unassisted value added and can be used to compare levels of assistance between activities and over time to indicate the net incentive effect on the use of resources in different activities.

In the literature, the ERA has also been defined as follows:

$$g = (df - X.dm) / (1 - X)$$

where
- g = ERA
- df = NRA, the nominal rate of assistance on outputs
- dm = NRM, the nominal rate of assistance on materials
- X = UM/UP = unassisted materials to output ratio
- UP = unassisted value of output
- UM = unassisted value of materials

As shown below, this formula is equivalent to the formula provided in Box A1.4.

Ignoring direct assistance to value-adding factors, net assistance is assistance to outputs less assistance to intermediate inputs, ie:

$$NSE = GSE - TEM$$

where
- GSE = AP – UP
- = UP (1 + df) – UP
- AP = assisted value of output

and TEM = AM – UM

= UM (1 + dm) – UM

AM = assisted value of materials

giving NSE = UP.df – UM.dm

which when divided by UP yields

NSE/UP = df – X.dm

The unassisted value added

UVA = UP – UM

which when divided by UP yields

UVA/UP = 1 – X

Thus, ERA = NSE/UVA = (df – X.dm) / (1 – X) = g

An advantage of expressing the ERA as a formula in terms of nominal rates is that the following relations can be shown between nominal and effective rates:

If df = dm, then g = df = dm

If df > dm, then g > df > dm

If df < dm, then g < df < dm

If df = X.dm, then g = 0

If df < X.dm, then g < 0

As indicated in Box A1.2, nominal rates of assistance may be calculated for intermediate inputs used in an activity as well as for outputs from an activity. It is usual, however, when mentioning nominal rates to be referring to the average nominal rate for an industry, group or sector. The ERA is the more complete measure of the net incentive effect of interventions on the use of resources in an activity.

The direct taxing effect on consumers, of government interventions to assist an activity, depends on the price effects of the output assistance provided to the activity and the importance of local supplies in total consumer expenditure. Forms of assistance, such as production subsidies, which raise producer returns without raising prices have no direct taxing effect on consumers. However, forms of assistance such as tariffs, which raise producer returns by raising prices, tax consumers. The tax on consumers may be significantly larger than the subsidy to producers if domestic production supplies only a small share of consumer demand. This arises because the cost to consumers is made up of higher priced local products plus higher priced (tariff-inflated) imports.

Within a country, relatively high levels of effective assistance to an activity indicate that extra returns are provided to the use of resources in that activity. This encourages additional resources into the activity to expand output or, alternatively, allows resources to be retained in the activity when they could yield more wealth if they were used elsewhere in the community. This misallocation of resources will reduce the potential for economic growth and associated gains in community welfare. An important feature of measuring assistance is to indicate differences (disparities) in levels of assistance between and within industries. The larger the disparities in levels of effective assistance, the greater the potential for resources to be used in activities that do not maximise economic welfare. In addition, wide disparities in nominal rates between goods are indicative of the potential for losses of consumption efficiency.